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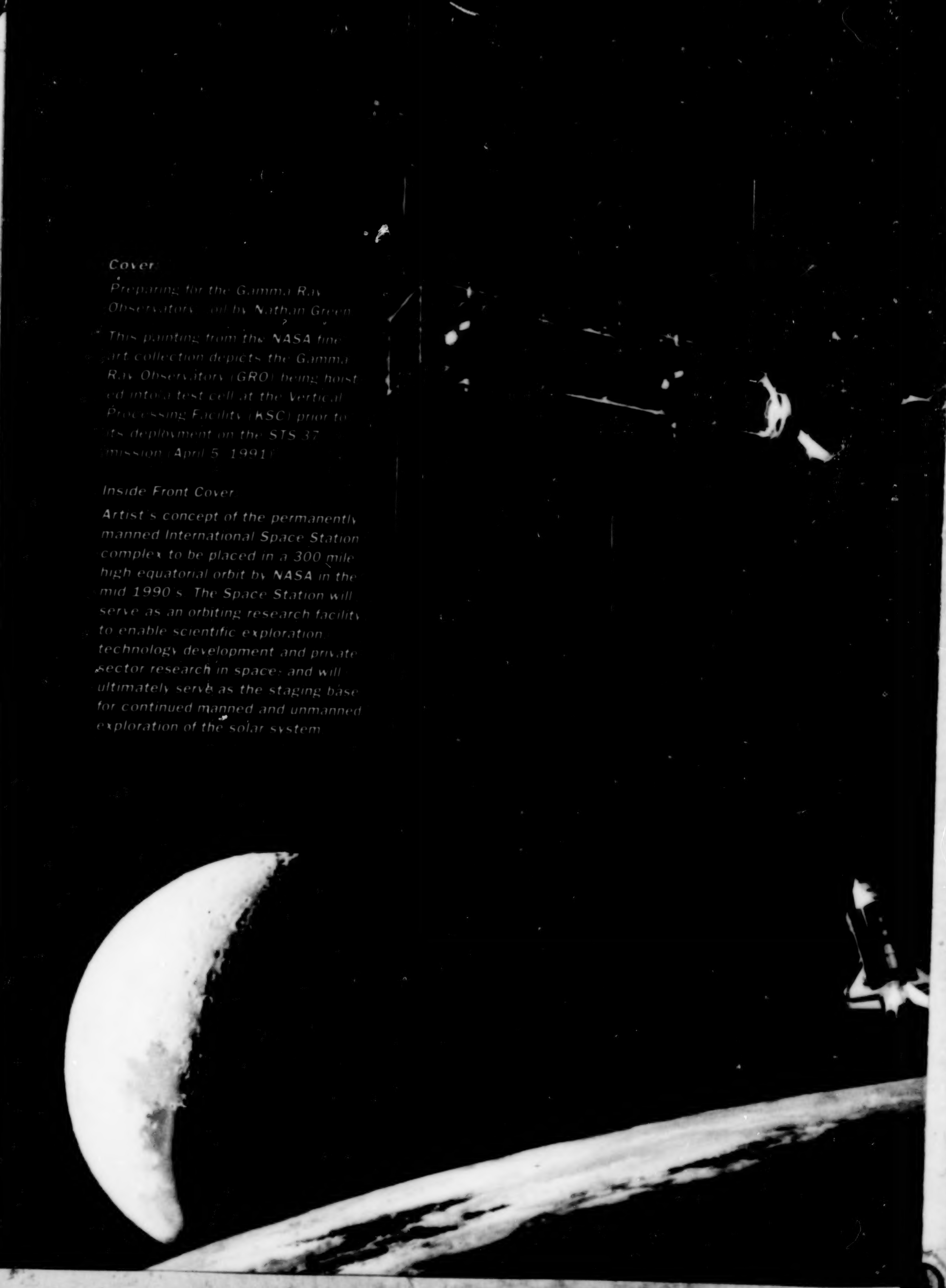

Cover:

Preparing for the Gamma Ray Observatory (oil by Nathan Green)

This painting from the NASA fine art collection depicts the Gamma Ray Observatory (GRO) being hoisted into a test cell at the Vertical Processing Facility (KSC) prior to its deployment on the STS-37 mission (April 5, 1991).

Inside Front Cover:

Artist's concept of the permanently manned International Space Station complex to be placed in a 300-mile-high equatorial orbit by NASA in the mid-1990's. The Space Station will serve as an orbiting research facility to enable scientific exploration, technology development and private sector research in space; and will ultimately serve as the staging base for continued manned and unmanned exploration of the solar system.

Doing Business with NASA

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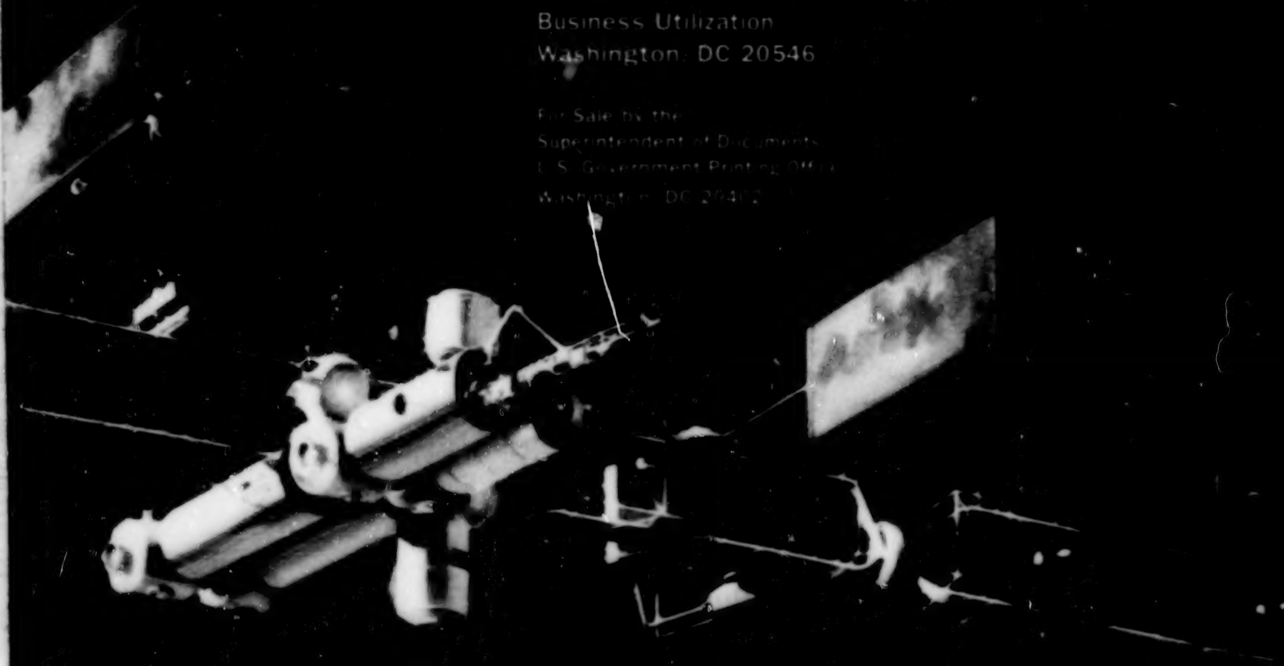

NASA

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FOREWORD

Message to new and prospective NASA contractors

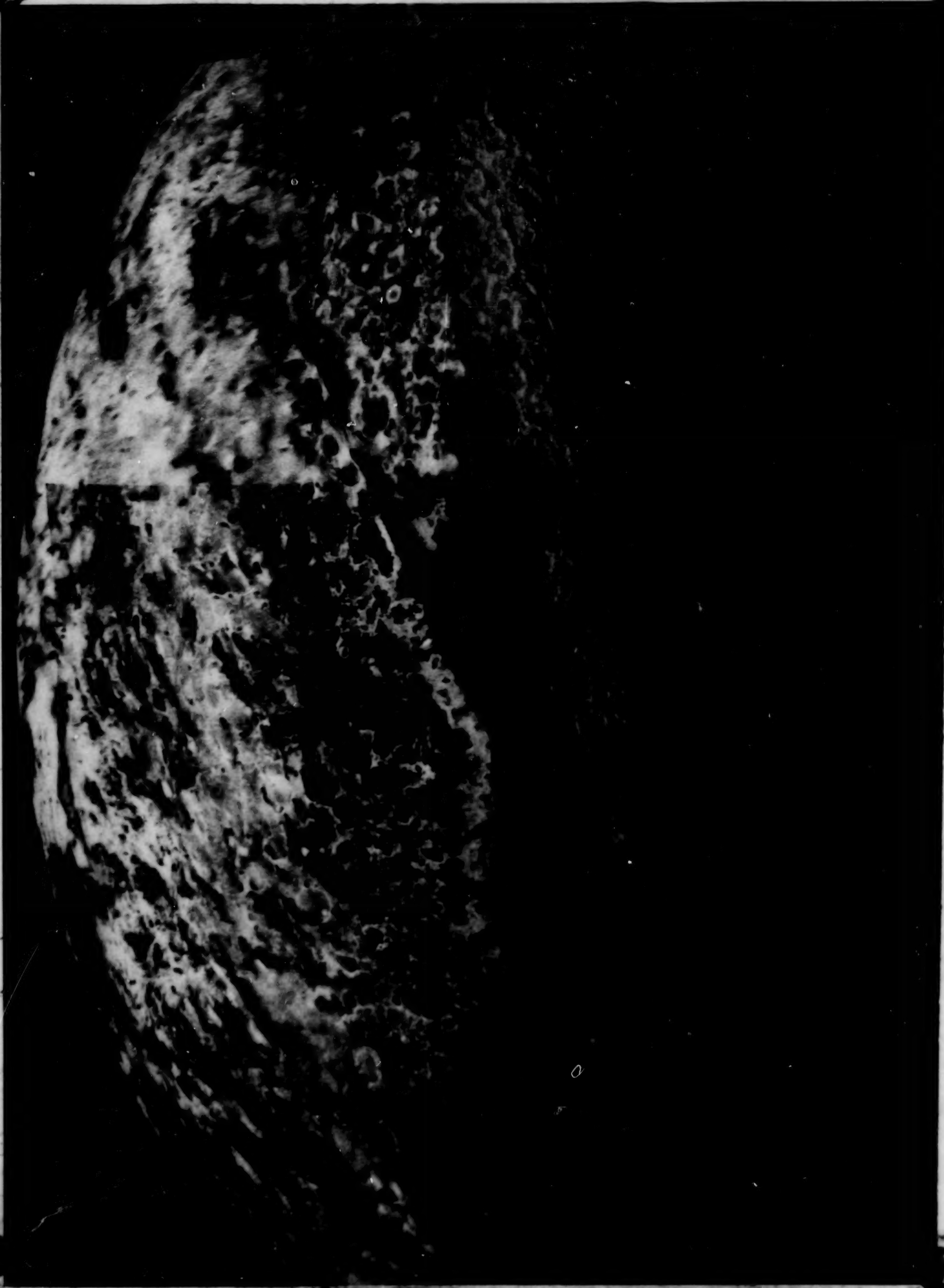
This handbook is designed to promote a better understanding of NASA's interests and the process of doing business with NASA. We seek your products and services—whether they are in the form of basic material or an abstract idea, fabricated component production, construction or manufacturing capability, or a specialized service. NASA purchases all of these and more.

Your expertise, potential, and willingness to participate in the advancement of aeronautical and space science and technology (through research, manufacturing efforts, or support services/products) are essential for accomplishing NASA's missions. I hope you will agree that NASA is open to your proposals when you read this publication and discover all the opportunities NASA offers.

We welcome your personal or written inquiry and trust that your marketing endeavors with NASA will be mutually profitable and fruitful.

NASA Administrator

Skyward streaming light silhouettes the Space Shuttle as searchlights at Pad A are trained on the STS 3 vehicle during loading for its cryogenic liquid oxygen and liquid hydrogen propellants.



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Voyager 2's final planetary encounter took place on August 25, 1989, when the spacecraft sailed within 3,000 miles of the cloud tops of Neptune's north pole. Five hours later, Voyager 2 swept past Triton, a cold, bright moon where volcanoes may spew ice particles into the thin nitrogen atmosphere. Now Voyager 2 is heading out of the solar system, diving below the eclectic plane to search for the beginning of interstellar space.

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CHAPTER 1

The National Aeronautics and Space Administration (NASA) was established by the National Aeronautics and Space Act of 1958 to plan, direct, and conduct aeronautical and space activities for peaceful purposes for the benefit of all mankind. NASA's goals in space are to develop technology to make operations more effective; to enlarge the range of practical applications of space technology and data; and to investigate the Earth and its immediate surroundings, the natural bodies in our solar system, and the origins and physical processes of the universe. In aeronautics, NASA seeks to improve aerodynamics, structures, engines, and overall performance of aircraft, as well as to make them more efficient, more compatible with the environment, and safer. This chapter acquaints prospective contractors with the organizational structure of NASA and briefly describes the major technical program offices and selected staff offices at the Headquarters level.

This Is NASA

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NASA's mission is planned, directed, and coordinated from its Headquarters in Washington, D.C., the focal point for policy and program formulation. The operational aspects of NASA's work in aeronautics and space are performed through its spaceflight centers, research centers and other installations at various locations throughout the country. Each installation has a specifically prescribed mission, with related tasks, and is allocated the resources necessary for their accomplishment. Though these NASA installations have unique "in-house" capabilities, their research and operations are pursued mainly through private industry, with the additional support of universities and other nonprofit research organizations. The installations and their major technical programs are described in Chapter 5.

The overall management and allocation of resources for NASA technical programs is accomplished through six Headquarters program offices. The primary research and development activities of these offices, which assign mission responsibilities to NASA field installations as appropriate, are as follows.

NASA Headquarters Offices are located near the U.S. Capitol in Washington, D.C.

Program Offices: Research and Development Activities

The Office of Aeronautics and Space Technology

The Office of Aeronautics and Space Technology is responsible for the conduct of programs to develop advanced technology to enable and enhance the aggressive pursuit of national objectives in aeronautics, space, and transatmospherics (including the National Aerospace Plane program); to demonstrate the feasibility of this advanced technology in ground, flight and in-space facilities to ensure its early utilization; and to ensure the application of NASA capabilities and facilities to programs of other agencies and the U.S. aerospace industry. In addition, the Office is responsible for managing the Ames, Langley, and Lewis Research Centers.

Aeronautics

In aeronautics, the Office of Aeronautics and Space Technology is responsible for the conduct of advanced research and technology programs which enable and enhance national objectives of enduring leadership in civil and military aviation; investigation of the feasibility of selected advanced technology at the component and systems level to establish benefits and practical utility of advances; support of the military in development and validation of technologies to achieve superior military systems; conduct of complementary research related to air transportation system safety and productivity in support of the Federal Aviation Administration; and application of unique NASA capabilities and facilities with programs of other government agencies.

The Office of Aeronautics and Space Technology's aeronautics program is the nation's primary source of innovative, long-term aeronautical and transatmospheric research and technology development. Research in aerodynamics, propulsion, materials and structures, information sciences, guidance and controls, human factors and flight systems provides a continuous flow of advanced technology and innovative concepts from which the U.S. aviation industry draws in developing safer, more efficient, and more effective generations of civil and military aircraft. Major thrusts include:

- Pioneering the development and validation of the fundamental knowledge base and numerical simulation techniques for analyzing and predicting external and internal flows, structural mechanics, control theoretics, and their interactions in order to enable practical application to aircraft, engine and aviation system design and operation.

- Resolving the critical environmental issues about atmospheric impact, airport noise, and sonic boom and establishing the technology foundation for viable supersonic cruise aircraft which could travel at speeds more than twice that of sound, have transpacific range, and operate at overall economies approaching subsonic aircraft.

- Development and flight validation of the critical technologies for future hypersonic and transatmospheric vehicles which will be capable of taking off and landing from conventional runways and sustaining hypersonic flight in the atmosphere or accelerating into space.

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- Technology for an entirely new generation of fuel efficient, superior U.S. aircraft which will improve the safety and efficiency of the National Airspace System and help alleviate noise and address other environmental concerns, including drag reduction, high-lift systems, advanced composite materials, hazardous weather detection, human-centered automation, and advanced controls and propulsion.

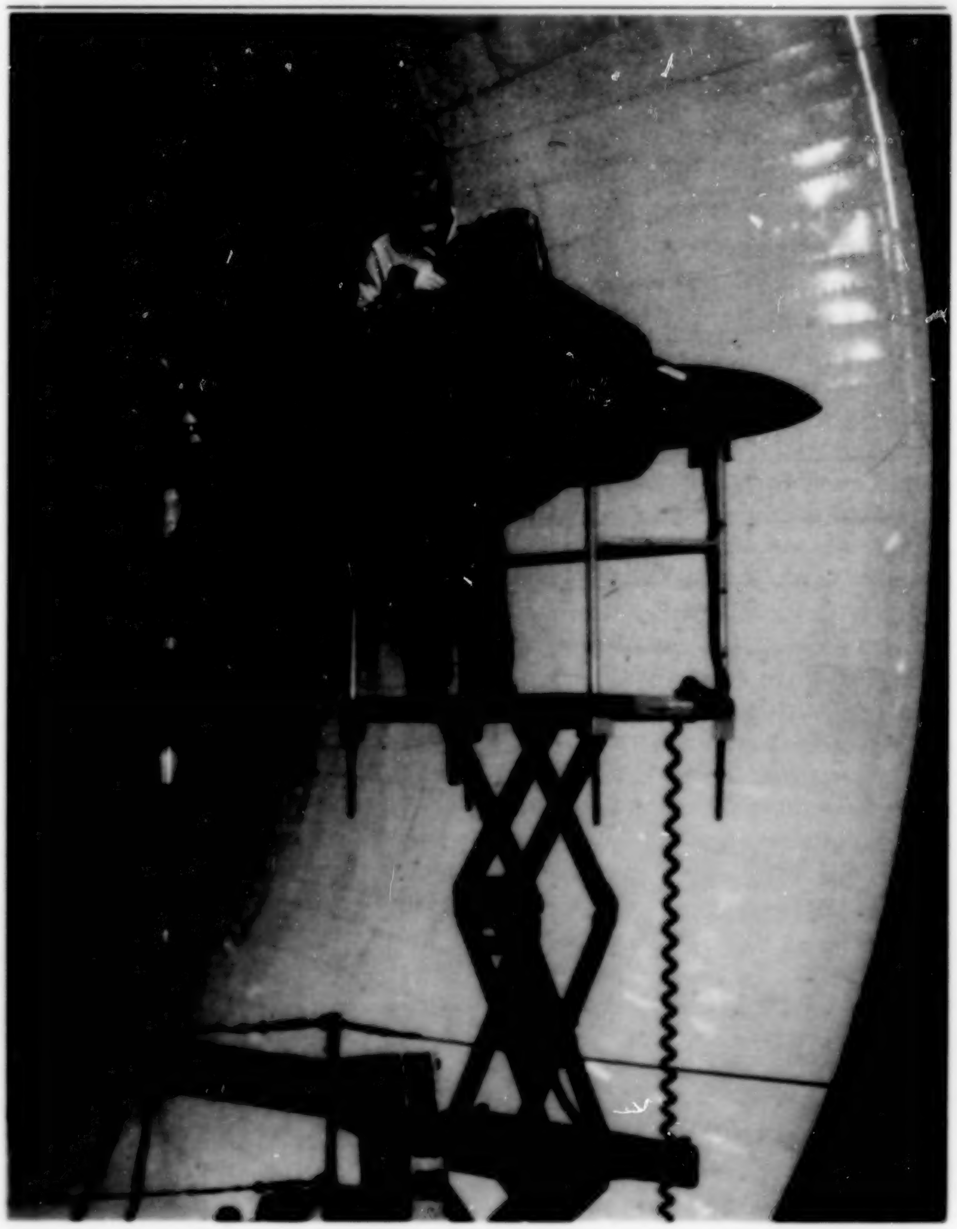
- Technology for advanced rotorcraft with the combined capability of vertical takeoff and high forward speed which will improve intercity and interregion transportation, reduce U.S. airport congestion without requiring major investments in new runway construction, and enhance military capability.

- High performance military aircraft technology to enable effective low-speed control at high angles-of-attack, supersonic short take off and vertical landing, and propulsive control for enhanced maneuverability.

- Advanced high temperature materials such as ceramics, ceramic composites, carbon-carbon, and metal-matrix composites for use in light weight airframes and high performance, uncooled turbine engines.

- Enhancement of the capabilities of NASA's Aeronautical Research Facilities by improving the productivity and integrity of these unique national assets and by extending capabilities in critical technology areas.

NASA engineer inspects a scale model of the F-16 XL aircraft before testing in a wind tunnel at Langley Research Center.



Transatmospheric Research

NASA is developing the crucial technologies for future hypersonic and transatmospheric vehicles in two separate programs, the National Aerospace Plane (NASP) and the Generic Hypersonics programs.

- The National Aerospace Plane program will develop and demonstrate, in flight, the essential technologies for the first generation of single-stage-to-orbit vehicles with air breathing propulsion as well as horizontal takeoff and landing.

This joint NASA/Department of Defense effort has proceeded from feasibility studies to a phase for technology development; it remains focused on the National Aerospace Plane flight-research vehicle, designated the X-30. It is anticipated that decision will be made in 1993 to proceed with the building of two X-30 airplanes. This work constitutes a high-risk, high-payoff program that will provide the technology for operational vehicles to provide flexible, efficient access to space in the twenty-first century.

The technical execution of the program is managed by the National Aerospace Plane Joint Program Office in Dayton, Ohio. A team of contractors, NASA Research Centers and other government laboratories is building the advanced technology base while other members of the contractor team provide most of the manpower on developing the X-30 design.

■ The NASA Generic Hypersonics program provides the continuum for longer-term research. It stresses fundamental understanding of the controlling physical and chemical phenomena for hypersonic aircraft and air-breathing engines.

Specific concerns for Generic Hypersonics include boundary-layer transitions at high Mach numbers, turbulent mixing and mixing enhancement, and very high-payoff metal-matrix composite materials. The program also emphasizes the advancement of methodologies for technology integration.

Space Research and Technology Program

The Office of Aeronautics and Space Technology, Space Research and Technology Program provides advanced, enabling technologies, validated at a level suitable for user-readiness, for application to future space missions. To achieve this goal, a broad base of advanced technology is required for vehicle and subsystems concepts, components, devices, and software. This is achieved by developing technical strengths in the engineering disciplines within NASA, industry, and academia, and performing critical technology validations that facilitate the transfer of new technology with a high level of confidence to future space missions. This program supports five thrusts related to space platforms, space transportation, space science, planetary surface and operations technologies.

To accomplish the technology for these thrusts, the Space Research and Technology Program is composed of two complementary parts: the Research and Technology Base program and the focused technology programs.

The objective of the research and technology base program is to gain a broader knowledge and understanding of the fundamental aspects of phenomena in critical disciplines. Within this base program high-leverage technological advances and concepts are brought to the level of demonstrating proof of principle.

The base program is the seedbed for generating the more mission-focused technology programs and consists of nine program elements: aerothermodynamics, space energy conversion, propulsion, materials and structures, space flight (including the In-Space Technology Program), systems analysis, information and controls, space communications and human support. In addition, the university space research program, supported by the research and technology base, includes research in critical areas to enhance and broaden the capabilities of the nations academic community to participate more effectively in the U.S. civil space program. It is an integral part of the strategy to strengthen the university space engineering research and technology base.

The program elements include the university space engineering research center program, which supports interdisciplinary research centers at nine universities; the university innovative research program, which provides grants to individuals with outstanding credentials; and the university advanced space design program, which funds advanced systems study courses at the senior level. Significant technical, research and educational benefits have begun to be demonstrated from the university space engineering and research centers, including attracting, retaining, and training graduate students and increased industry cooperation and support.

The research and technology base program will continue to serve as the seedbed for new technologies and capability enhancement. Additional emphasis will be placed on newly emerging high-leverage technologies, including aerothermodynamics, materials and structures, and system analysis.

■ **Focused programs**, based on requirements provided by the potential users of the technology, develop technology for specific future applications and deliver products in the form of proven hardware, software, design techniques and data. Starting in FY 1993, the Civil Space Technology Initiative (CSTI) program will be restructured to focus on research in five categories: space science, planetary surface, transportation, space platforms and operations. CSTI is a vital component of NASA's Space Research and Technology program, intended to build NASA's technical strength and to provide options for high-priority future civil space goals. The CSTI's research efforts are critical to ensure that the capabilities to accomplish future space missions will be available when needed. The following discusses the CSTI program thrusts.

■ **The space science technology** thrust is primarily concerned with developing the advanced technologies required for acquiring and processing observations from future space and Earth science missions. Specific space science program areas include science sensing and observatory systems. The principal program emphasis will be on creating technology options for the next decade's Space Science missions, as well as providing the enabling technologies for the pool of missions in the Office of Space Science and Applications (OSSA) Strategic Plan beyond the decade.

■ **The planetary surface technology** thrust, which includes elements that were formerly part of the Exploration Technology program (initiated in FY 1989), will play an important role in NASA's development of a broad set of technologies necessary to enable future solar system exploration missions, including a lunar outpost, robotic precursors to the Moon and Mars, and the eventual human exploration of Mars. The planetary surface technology thrust is a prerequisite to future robotic and human planetary surface mission operations. The surface systems area will provide technology required to support the power needs of humans and machines on planetary surfaces such as the Moon and Mars. The human support area will provide the unique technologies required for safe and effective deep-space human exploration missions to be accomplished.

- **The transportation technology** thrust is primarily concerned with providing the technology needed for future major transportation improvements. The overall goal of the transportation technology thrust is to develop and validate technologies that will provide new capabilities for current and future space transportation vehicle systems, reduce life-cycle costs, substantially improve safety margins and reliability, and increase system availability. Additional emphasis also will be placed on facilitating the transfer of these emerging technologies to the commercial space sector through joint or cooperative activities with industry,

- **The space platforms technology** thrust is primarily concerned with providing the technology needed for future space platforms for the following mission classes: unmanned Earth orbiting platforms in low Earth orbit or geosynchronous Earth orbit, manned Earth orbiting platforms (space stations), and deep-space platforms. The overall technology goal is to enhance future science, exploration and commercial missions by providing lightweight, durable, stable, and accurately pointed platforms, and highly efficient platform utilities. Once achieved, these advances will lead to reductions in spacecraft launch weight, (reduced life-cycle costs by decreasing on-orbit maintenance and logistics resupply needs) and increased lifetime operability.

- **The goal of the operations technology** thrust is to develop and validate technologies to reduce the cost of NASA operations, improve the safety and reliability of those operations, and enable new, more complex, activities to be undertaken. It will also provide the high capacity data transfer, storage and processing that is implicit in expanding scientific and exploration endeavors. The thrust will provide technology for NASA users and the commercial sector and will support major operational improvements for future robotic and human missions both on the Earth and in space.

High Performance Computing and Communications

The NASA High Performance Computing and Communications (HPCC) Program is conducting research and development to accelerate the application of high performance computing to meet NASA science and engineering needs. NASA is a major participant in the Federal HPCC Program. The Federal Program goals are to: extend U.S. leadership in high performance computing and communication technology; disseminate and apply HPCC technology widely on problems of National importance; and spur gains in U.S. productivity and industrial competitiveness.

The NASA HPCC program will: purchase advanced high performance computing testbeds to build and evaluate applications software and provide feedback to successive generations of high performance computing systems; develop applications software to solve major NASA computational challenges; support the deployment of a nationwide high-speed computer network; expand high performance computing basic research and human resource development at NASA research institutes and university centers of excellence. Partnerships between government, academia and industry will be utilized wherever possible.

NASA's HPCC program is organized into two main projects closely related to the agency's primary missions:

- **The Computational Aerosciences (CAS)** project is conducted by Ames Research Center with Langley and Lewis Research Centers contributing. The goal of CAS is to enable the multidisciplinary simulation of aerospace vehicle design concepts such as integrated airframe/propulsion/control system design. Specific application areas include high speed civil transport, powered lift, National Aerospace Plane-Derived Vehicle, and aerobrake.

- **The Earth and Space Sciences (ESS)** computing project is conducted by Goddard Space Flight Center supported by the Jet Propulsion Laboratory. The major goal in ESS is to support collaborative simulation and modeling of complex, large scale, multidisciplinary earth and space phenomena. An example is the modeling of interactions between the earth's atmosphere, oceans and land masses with sufficient spatial resolution to accurately predict long term trends in atmospheric circulation, an important factor in the water cycle. Specific applications include Earth Systems Science, Massive Data Analysis, Planetary Evolutionary Processes, Biogeochemical Lifecycles, Space and Solar-Terrestrial Physics and Astrophysics and Astronomy.

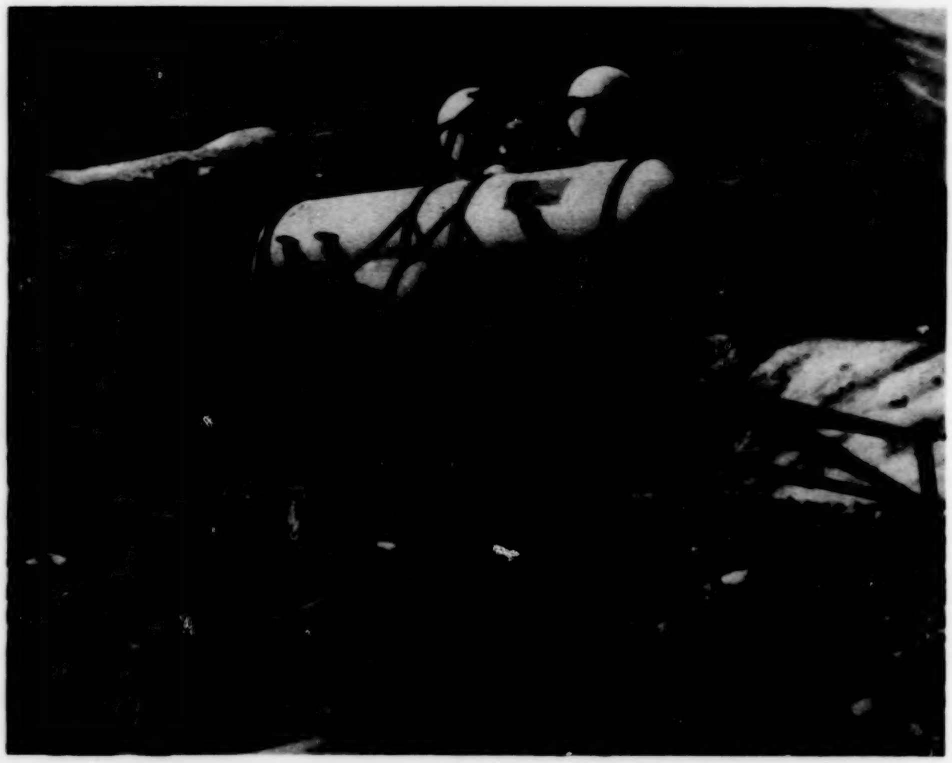
The Office of Exploration

The Office of Exploration is responsible for planning and executing the human exploration of the Moon and Mars. Established in 1991 in response to recommendations from two independent blue-ribbon commissions, the Office identifies high-priority exploration technology and systems capability requirements (such as launch vehicle capability), develops and implements specific exploration missions, and serves as the focal point for coordination with the Department of Defense, the Department of Energy, the National Science Foundation, and other government agencies regarding the planning and conduct of the nation's space exploration activities. The technical components of the Office's activities are managed through the Lunar and Mars Exploration Program Office at Johnson Space Center.

The Office is currently pursuing a two-fold approach to the exploration program. For the near-term, a series of data and capability needs have been identified that must be addressed prior to the return of astronauts to the Moon and eventual missions to Mars. Data needs include gravity, terrain, and resource maps of the Moon and Mars; capability needs include communications and navigation networks to support subsequent missions. The Office intends to utilize a range of management approaches to collect the required data, ranging from traditional in-house missions to commercial "data buys;" i.e., contracting with a private sector firm (or firms) to provide products—for example a gravity map of the Moon—as opposed to contracting for launch vehicles and payloads. In addition, near-term efforts will include the development of a "modular" lunar lander capability for emplacing future scientific and engineering payloads on the lunar surface.

For the long–term, the Office is currently conducting activities in anticipation of larger-scale human missions. Efforts are underway to assess potential exploration architectures for planning subsequent exploration missions. These studies will gradually give way to the advanced systems development, flight demonstrations, and extension of mission capabilities required to meet the challenges of initiating future exploration missions. In parallel, work is underway to increase the basic understanding of the many technologies that will be required to satisfy the nation's exploration objectives, such as a base on the Moon and an expedition to Mars. Key areas include lightweight materials, nuclear power and propulsion technologies, life sciences research, radiation protection technologies, and life support systems.

In all of these activities, the Office of Exploration is committed to seeking out and using the most cost-effective and innovative approaches available, including approaches to project management, procurement, and mission development and operations.



Artist's concept of a Lunar Excursion Vehicle descending to a permanently occupied lunar outpost. The vehicle, to be based on the Moon, provides transportation to and from the surface and lunar orbit for both cargo and crew.

The Office of Space Flight

The Office of Space Flight (OSF) has programmatic responsibility for Space Shuttle and Spacelab/Space Station responsibility for 12,000 civil servants and four major NASA field centers: Johnson Space Center, Kennedy Space Center, Marshall Space Flight Center, and Stennis Space Center.

The Office of Space Flight provides unique capabilities to NASA and to the United States in the areas of space transportation and infrastructure. OSF supports a wide range of customers, including public and private sector interests and foreign governments and in some instances, serves as its own customer. Foremost among the beneficiaries of the civil space program is the American public, to whom the Office of Space Flight is committed to bringing the highest quality effort in the most cost-effective manner. In addition, OSF carries out the direction set forth by the President and the Congress and supports the objectives and goals established by the NASA administrator.

Space Shuttle

The Space Shuttle has produced enough Space Age firsts to fill an almanac. Dozens of commercial, scientific, and military satellites have been delivered to orbit—two were retrieved and brought back to Earth, and two were plucked out of orbit, repaired in the Shuttle's cargo bay and put back to work. Arguably the world's most technologically advanced and complex machine, the Space Shuttle has flown more flights and carried into space twice the number of astronauts in its initial years as the Mercury, Gemini, and Apollo programs did in ten years.

The Shuttle, designed to transport cargo into near-Earth orbit, is the primary means that NASA uses to transfer cargo and personnel to Earth orbit, and will play a central role in the assembly, supply, and maintenance of the Space Station Freedom. In addition, the Shuttle serves as a temporary and valuable life sciences laboratory from which new data are collected on how the body responds to weightlessness. It is also used as a temporary construction base from which solar panels are unfurled and tested, and components of future space structures erected and tested by astronauts to prepare for Space Station Freedom.

The Shuttle has delivered over two dozen satellites to orbit. In 1984, the Shuttle rendezvoused in orbit with the ailing Solar Maximum scientific satellite, which had been drifting uselessly in orbit for three years. The Shuttle's crew retrieved it, fixed it, and sent it back to work in orbit.

The Spacelab/Space Station Utilization Program

This program is a multifaceted program which provides on orbit laboratory services to customers using a number of different facilities—presently the Spacelab, Get Away Special Hardware, Hitchhiker, and other Shuttle Carrier systems. As the Space Station is assembled on orbit, services will also be provided on board the Space Station, first on a temporary, relatively short duration basis and later on a permanent, long duration basis.

SPACELAB is a reusable science observatory and laboratory developed by NASA and the European Space Agency that is flown in the Shuttle payload bay. Spacelab provides a pressurized lab for the crew as well as a number of unpressurized platform pallets for the operation of exposed payloads such as telescopes.

The Get Away Special, Hitchhiker, and other Shuttle Carrier systems provide simpler, and less expensive interfaces for supporting smaller and simpler experiments.

The Space Station will be a permanently manned facility in low-Earth orbit. It will provide a laboratory for research in many scientific disciplines, but work in material science and life science which can uniquely use a low gravity environment will be emphasized. The Space Station will also serve as a platform for observing instruments; it will also be an important test-bed for the technology applicable to very long duration space missions.

The operation and utilization of the Space Station will be an integrated effort involving NASA and our international partners—Canada, the European Space Agency, and Japan. This will provide all the partners with unique opportunities to conduct research operations in space.

The Tethered Satellite System is a unique Shuttle Carrier system developed by NASA and the Italian Space Agency. With the Tethered Satellite, which is scheduled for a first flight in 1992, a reusable satellite can be deployed from the Orbiter on a tether for distances up to 100 kilometers. In this way, regions of the atmosphere not normally available with Shuttle missions can be made accessible for study.

The Institution

The Office of Space Flight exercises institutional management authority over the Johnson Space Center, the Kennedy Space Center, the Marshall Space Flight Center, and the John C. Stennis Space Center. The NASA field centers are responsible for the design, development, and operation of all Office of Space Flight programs.

The Office of Space Systems Development

The Office of Space Systems Development (OSSD) has programmatic responsibility for development of the Space Station Freedom; large propulsion systems, including the new national launch system and its new space transportation engine; other large space flight developments; and the advanced transportation systems program planning function. At present OSSD has three large programs in various stages of development: Space Station Freedom, the Advanced Solid Rocket Motor, and the National Launch System. These programs are outlined below.

■ Space Station Freedom

The Space Station Freedom Program is a highly complex international development program which builds on a number of NASA and international partner capabilities. Initiated by President Reagan in 1984, the design, development, and operation of Space Station Freedom is an integrated effort that will support important space activities of the United States and our international partners, the European Space Agency, Canada and Japan. Space Station Freedom is essential for advancing human exploration of space. It is where we will learn to live and work productively in space; it will provide an advanced laboratory to explore space and employ its resources; and it will provide us the opportunity to learn to build, operate and maintain systems in space.

Space Station Freedom will be a permanently manned outpost in low-Earth orbit. It will provide unprecedented opportunities for first-class basic and applied microgravity research in life and materials science. When Freedom becomes permanently occupied, the work environment will be similar to an Earth-based laboratory, within which investigations will be expanded in number, duration and complexity. The permanency of Freedom will allow scientists and engineers to routinely study, develop and employ the resources and potential of space in a microgravity environment for prolonged periods of time.

Space Station Freedom is America's critical next step for human exploration of the solar system. It will be a permanent facility for multi-year studies of human adaptation, testing of life support systems and experience in the building, maintaining, and operating of a large manned space system.

The program is divided into and managed at three distinct "work packages" in addition to management and planning activities at three separate sites.

NASA Headquarters

NASA Headquarters in Washington, DC, is responsible for overall management and policy development.

Space Station Program Office

The Space Station Program Office is located in Reston, Virginia. Also known as Level II, the program office is responsible for day to day program management and overall system engineering and integration and program control. The hardware and software development activities are executed through the five Level III projects described below.

- **Work Package 1.** Work Package 1 is under management of the Marshall Space Flight Center (MSFC) in Huntsville, Alabama. It involves the building and outfitting of the pressurized modules for the laboratory, habitat, resource nodes, and logistics carriers. MSFC is also responsible for development of the environmental and life support system, internal thermal management system, and the internal audio and video systems. Boeing is the prime contractor for all Work Package 1 development activities.

- **Work Package 2.** Work Package 2 is under management of the Johnson Space Center (JSC) in Houston, Texas. Its responsibilities include developing the truss structure to which the various elements of the program will be attached as well as outfitting the resource nodes with subsystems, developing the airlock, and developing the remote manipulator system Shuttle/Station interface and mobile transporter. Work Package 2 responsibilities also include development of the program's subsystems including: the propulsion system; external thermal management system; communications systems; tracking; data management; guidance, navigation and control; and the external audio and video. McDonnell Douglas is the Work Package 2 prime contractor.

- **Work Package 4.** Work Package 4 is managed by the Lewis Research Center near Cleveland, Ohio. Its activities include developing the solar power system including the power generation, conditioning, and storage, and distribution systems. Rocketdyne is the Work Package 4 prime contractor.

Additionally, there are Space Station operations activities at two locations:

Mission Operations Planning Office

The Mission Operations Planning Office is located within the Mission Operations Directorate at the Johnson Space Center and is responsible for mission operations planning, requirements planning, flight control planning, crew training, and Space Station Control Center development, including training of control center personnel.

Kennedy Space Center

Kennedy Space Center (KSC) is located near Titusville, Florida. Its Space Station related activities include planning for integration and verification of Space Station components, logistics payloads, and launch schedule and requirements for the Space Shuttle, and construction of the Space Station Processing Facility.

■ The Advanced Solid Rocket Motor

The Advanced Solid Rocket Motor (ASRM) is being designed for use on the Space Shuttle to increase safety/reliability margins through reduced critical failure modes, improved joint design, and enhanced hardware and propellant producibility. When available, the ASRM will replace the Redesigned Shuttle Rocket Motor (RSRM) now used by the Shuttle. The ASRM will increase the Shuttle payload capacity by a minimum of 12,000 pounds. This increased capacity will significantly enhance the Space Station Freedom assembly sequence and provide flexibility in payload manifesting.

The ASRM project office is located at Marshall Space Flight Center near Huntsville, Alabama.

■ The New Launch System (NLS)

In joint development effort with the Department of Defense, NASA is undertaking the development of a new space launch system to meet civil and national security needs. The goal of this launch program is to greatly improve national launch capability with reductions in operating costs and improvements in launch system reliability responsiveness, and mission performance.

The new launch system, including manufacturing processes and production and launch facilities, will be designed to support a range of medium to heavy-lift performance requirements and to facilitate evolutionary change as requirements evolve. The design may take advantage of existing components from both the Space Shuttle and existing expendable rockets in order to expedite initial capability and reduce development costs. While initial missions will be unmanned, the new launch system will be "man-rateable" and will eventually perform manned missions.

The new launch system will be managed, funded, and developed jointly by the Department of Defense and NASA. The development program has the goal of first flight in 2002 based on 1992 projected funding levels. Since this system will provide significant long-term benefits to the U.S. commercial space launch industry, the government will actively explore the potential for U.S. private sector participation in the development program. Early program funding, in 1992 and 1993 will focus primarily on Space Transportation Main Engine development because the engine program is the critical schedule path.

The Department of Defense and NASA will plan for the transition of selected space programs from current launch systems to the new launch systems at appropriate program milestones to insure mission continuity and to minimize satellite and other transition costs.

The Office of Space Systems Development maintains an NLS program office while the joint program office is located with the U.S. Air Force Space Division in Los Angeles, California.

The Office of Space Science and Applications

The Office of Space Science and Applications (OSSA) is responsible for planning, directing, executing, and evaluating that part of the overall NASA program which pursues the goal of using the unique characteristics of the space environment to conduct a scientific study of the universe, to understand how Earth works as an integrated system to solve practical problems on Earth, and to provide the scientific and technological research foundation for expanding human presence beyond Earth orbit into the solar system.

OSSA pursues these goals through an integrated program of ground-based laboratory research and experimentation; suborbital flight of instruments on airplanes, balloons, and sounding rockets; flight of instruments and the conduct of life sciences and microgravity research on the Shuttle/Spacelab system and on Space Station Freedom; and development and flight of automated Earth-orbiting and interplanetary spacecraft. There are eight divisions within OSSA:

The Administration and Resources Management Division

This division is responsible for OSSA fiscal and institutional management, and for the coordination of OSSA educational activities, public affairs, and Congressional relations.

The Flight Systems Division

The Flight Systems Division is responsible for managing and integrating OSSA science, and utilizing technology of the Space Shuttle, Spacelab, and Space Station Freedom.

Each of the other six program Divisions emphasize and apply a different scientific discipline to successfully accomplish the Office of Space Science and Application's goals:

Astrophysics

Astrophysics has the goals of understanding the origin and fate of the universe and the birth and evolution of the large variety of objects in the universe, from the most benign to the most exotic; and probing the fundamental laws of physics by examining the effects of extreme physical conditions on matter.

Earth Science and Applications

Earth Science and Applications has the goal of understanding Earth as a system, including the interactive processes that maintain the global surface environmental balance, and those processes—both natural and anthropogenic—that are acting to change that balance. The strategy to accomplish this goal involves basic research to understand the physics, chemistry, and biology of interlinked Earth system processes, remote sensing from space for global-scale examination of Earth, and modeling and data analysis to provide a conceptual and predictive understanding of Earth as a system.

Below: NASA's Hubble Space Telescope, launched by NASA, April 1990 - one of the four "Great Observatory" launches by NASA to study the Universe.

Life Sciences

Life Sciences, which has the goals of ensuring the health, well-being, and performance of humans in space; developing an understanding of the role of gravity in living systems; expanding our understanding of the origin, evolution, and distribution of life in the universe; and promoting the application of life sciences research to improve the quality of life on Earth.

Microgravity Science and Applications

Microgravity Science and Applications has the goals of utilizing the unique characteristics of the spaceflight environment to conduct basic research in physics and chemistry with special emphasis on fundamental phenomena, materials science, and biotechnology; of understanding the behavior of materials in a reduced gravity environment; and, where possible, of demonstrating the production of improved materials that have high technological utility.

Solar System Exploration

Solar System Exploration has the goals of understanding the origin, evolution, and current state of the solar system and the planets, moons, asteroids, and comets within it, including the search for planetary systems around other stars; of understanding Earth through comparative planetary studies, and of establishing the scientific and technical data base required to support major human activities on other planets.

Space Physics

Space Physics has the goals of understanding the sources and interaction of particles and electromagnetic fields in the space environments of Earth and other solar system bodies; understanding the Sun as a star and as a source of interplanetary mass and energy; understanding the solar-terrestrial connection; and understanding the origin, transport, and interac-

NASA's Office of Exploration is studying potential scenarios for human exploration of the solar system in the early part of the 21st Century.

tion of energetic particles and plasma, both within the solar system and throughout the galaxy.

The Office of Space Science and Applications has institutional and management responsibility for Goddard Space Flight Center (GSFC) and the Jet Propulsion Laboratory (JPL).

The NASA Resident Office-Jet Propulsion Laboratory provides the on-site government management and oversight of a full range of institutional issues as well as the negotiation and administration of NASA contracts with Caltech, subcontract approvals, legal counsel and program assurance and technical support.

The Office of Space Communications

The Office of Space Communications (OSC) is responsible for providing worldwide tracking, command, telemetry, data acquisition, and facilities required in support of NASA and other agency programs. Support is provided to Planetary Spacecraft, Earth Orbiting Satellites, Shuttle Missions, Sounding Rockets and Balloons, and Aeronautical Test Vehicles. The Office of Space Communications has a world-wide Space and Ground Network for deep space missions and earth-orbital missions respectively, which provide this support.

The Space Network is the most complex and sophisticated tracking system in the world. It is comprised of the Tracking and Data Relay Satellite System (TDRSS) and supporting ground elements, which include the Network Control Center (NCC), NASA Ground Terminal (NGT), Flight Dynamics Facility, and the Simulation Operations Center (SOC).

The Ground Network provides Earth-based tracking and data acquisition support services to all NASA science and engineering missions for vehicles in high Earth orbit and in Deep Space. There are three separate networks: the Deep Space Network, the Spaceflight Tracking and Data Network; and the Aeronautics, Balloons, and Sounding Rocket Program. The Office of Space Communications provides a global communications system linking the tracking sites with all the above facilities that provide real-time data processing for mission control, orbit and attitude determination, and routine processing of telemetry data for space missions.

The following list includes the Office of Space Communications' specific goals and objectives:

- Improving the efficiency of handling and processing large volumes of data.
- Upgrading the communications support provided by NASCOM (the NASA network of leased communications services for operational data flow among stations, central facilities, and users) to meet the demands of NASA missions with higher data rates.
- Providing technology development to facilitate use of the Tracking and Data Relay Satellite System space network.
- Continuing support to the aeronautics, sounding rocket, balloon, and geodynamics programs.
- Modernizing mission-support computing.
- Providing a single, efficient network for program-support communications.
- Continuing the definition of the Tracking and Data Relay Satellite System follow-on system.

Staff Offices

In addition to the program offices described above, there are several key staff offices at the Headquarters level which have significant responsibilities relative to NASA procurement or otherwise frequently interact with NASA contractors.

The Office of Management Systems and Facilities

The Office of Management Systems and Facilities has both a NASA Headquarters-specific and Agency-wide set of responsibilities. For NASA Headquarters, it is responsible for directing and coordinating facility, business, and administrative services. These services include the following functional areas: Construction and Operation of NASA's new Headquarters Building, Facilities Management, Administrative Operations, Planning and Resources Management, Information and Technology Management, Executive Management Support to the Office of the Administrator, and the Exchange Operations.

For NASA as an Agency, this office has program management responsibility for construction of facilities and automated administrative information systems. It has functional management responsibility for information resources management (IRM), facilities engineering and maintenance, as well as logistics, security, and aircraft management. The offices responsible for these functions are excellent sources of information and advice on opportunities for private sector involvement. One key source is the Scientific and Technical Information program, managed by the IRM Office, which is responsible for both disseminating NASA's research and engineering results and providing access to the aerospace literature data base for use by both NASA and the greater aerospace community.

The Office of Human Resources and Education

The Office of Human Resources and Education is responsible for policy direction, functional management and coordination for the Agency's personnel information systems, and occupation health programs. This organization advises the Administrator and oversees the allocation of civil service workyears, associated compensation, and travel funds agency-wide. The Office also provides operational support to the NASA Headquarters offices encompassing the full range of activities relating to personnel management, training and development, occupational health, budget and ceiling allocations for personnel and travel.

This Office conducts the NASA education programs and activities which are designed to meet national educational needs and to ensure a sufficient talent pool to preserve United States leadership in aeronautical and space science and technology. NASA's unique scientific and technological projects and programs are used to inspire the student's interest in mathematics, science, and engineering. These programs reach elementary, secondary, high school, and college students.

The Office of Procurement

The NASA Headquarters Office of Procurement has functional management responsibility for NASA's procurement programs. It develops and implements policies and procedures governing the operations of procurement activities for the entire agency. It is responsible for the direction, coordination and review of all procurement functions, including planning, soliciting, evaluating, contracting, and administration. It is responsible for implementation of the Federal Acquisition Regulation and for developing additional procurement regulations required for the accomplishment of NASA's mission. Other responsibilities include compilation and analysis of procurement information and the preparation of periodic and special reports on NASA procurement activities.

The Headquarters Acquisition Division is the procuring organization for Headquarters program and staff offices. As a result of the diverse nature of Headquarters programs, this division handles a wide variety of research, study and support contracts. Like all NASA installations, it negotiates and awards grants and cooperative agreements for scientific research to qualified institutions. The division also has agency-wide responsibility for foreign procurements.

The following are typical Headquarters procurement requirements: management analysis studies in support of program and staff offices; system engineering services; reliability studies; services relating to radio, TV, motion pictures, exhibits, graphics and publications; automated data processing hardware, software and related services; patent services; economic studies; and technical information services, including technical writing and foreign language translations.

The Headquarters Space Station Freedom Procurement Office performs the full range of acquisition functions required to support the NASA Space Station Freedom Program Office in Reston, Virginia. The Space Station Freedom Procurement Office is co-located with the Program Office.

Office of Policy Coordination and International Relations

The Headquarters Office of Policy Coordination and International Relations (OPCIR) is the focal point within NASA for interagency and international policy coordination and implementation. It provides NASA representation in interagency activities. It negotiates interagency policy issues and conducts studies and analysis of civil space policy issues. In addition, the OPCIR is responsible for managing the coordination and negotiation of bilateral and multi-lateral agreements with foreign entities and international organizations.

This office also provides the agency focal point for NASA liaison with the Department of Defense and with the intelligence community, as well as supporting national service initiatives of the Administration. These functions are performed to ensure that effective relations with the Executive Branch and international community are maintained.

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The Office of Small and Disadvantaged Business Utilization

The Headquarters Office of Small and Disadvantaged Business Utilization is responsible for the development and management of NASA programs to assist small businesses as well as firms which are owned and controlled by socially and economically disadvantaged individuals.

The office functionally oversees and directs the activities of corresponding offices at each NASA installation. The primary objective of the small business program is to increase the participation of small and disadvantaged businesses in NASA procurement. In support of this objective, the office offers individual counseling sessions to business people seeking advice on how to best pursue contracting opportunities with NASA (see Chapter 3). Specific guidance is provided regarding procedures for getting on solicitation mailing lists, current and planned procurement opportunities, arrangements for meetings with technical requirements personnel and various assistance or preference programs which might be available (see Chapter 4).

The Office of Commercial Programs

The Office of Commercial Programs provides the focus within NASA for an agencywide program supporting the expansion of U.S. private sector investment and involvement in civil space activities.

The office is responsible for programs actively supporting new high technology commercial space ventures, the commercial applications of existing aeronautics and space technology, and expanding commercial access to available NASA capabilities and services. The office manages the NASA Industrial Applications Centers and the Centers for the Commercial Development of Space. It is also responsible for the Small Business Innovation Research program.

NASA Small Business Offices offer individual counseling sessions to businesses interested in marketing opportunities.

Equal Opportunity Programs

Pursuant to Executive Order 11246, as amended, and the rules and regulations of the Department of Labor, a standard "Equal Opportunity" clause is prescribed for use in all non-exempt contracts in excess of $10,000. Under this clause, procurement specialists are responsible for ensuring that contractors or subcontractors do not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, and are required to take affirmative action to ensure equal employment opportunity.

A bidder or offeror may be required to include a representation concerning the filing of compliance reports in accordance with the Equal Opportunity clause in his/her bid or proposal.

Additionally, Executive Order 11141 and the Age Discrimination in Employment Act of 1967 prohibit discrimination on the basis of age. Further, the Rehabilitation Act of 1973, as amended, and Executive Order 11758 cover non-discrimination standards with respect to the Handicapped. The Vietnam-era Veterans Readjustment Act of 1974, as amended, prescribes affirmative action requirements in the employment and advancement of qualified disabled veterans and veterans of the Vietnam era.

An Equal Opportunity Officer is available at each NASA installation to assist prospective contractors in understanding and meeting the equal opportunity requirements.

CHAPTER 2

The policies and procedures for conducting NASA procurements are contained in the Federal Acquisition Regulation (FAR) and the Federal Information Resources Management Regulations (FIRMR). The FAR, and FIRMR, together with the NASA FAR Supplement, which contains regulations uniquely applicable to NASA, are the governing authority for NASA procurements. These documents are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The information presented in this chapter is intended to briefly acquaint individuals who are new to Federal procurement with the basic process, but it should be understood that the actual rules and procedures are substantially more complex. The FAR, or other competent authority, should be consulted for a more thorough review of the procurement process.

The Procurement Process

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Identification of the Requirement

The procurement process typically is initiated when a particular program or project office identifies a requirement and submits a procurement request to the procurement office. The assigned contracting officer, in consultation with the small business representative and the technical officer, will then make several key decisions.

One of these is whether the required supplies or services are available from other Government sources, such as stock items at a General Services Administration (GSA) supply depot, or if they may be purchased from authorized suppliers listed on a General Services Administration Federal Supply Schedule. If so, the contracting officer must acquire the items from the depot directly or from suppliers on the schedule. Thousands of common articles (office equipment and supplies, for example) are included on the Federal Supply Schedule, and firms interested in getting their products listed should contact a Business Service Center of the General Services Administration for additional information.

Another important decision is whether the procurement should proceed under one of the preference programs described in Chapter 4 (such as setting the procurement aside for the exclusive participation of small businesses). The appropriate method of conducting the procurement is also decided–whether it should be by sealed bids, competitive proposals or other competitive procedures. In rare cases, a noncompetitive procurement technique may be necessary (such as when there is only one responsible source). Once these decisions have been made, the contracting officer begins the preparation of the solicitation package and arranges for the announcement of the solicitation through various channels.

The Commerce Business Daily, Bid Rooms and Small and Minority Business Specialists at each installation are important sources of information on NASA procurements.

Announcement of the Solicitation

Several techniques are used to inform prospective bidders of contracting opportunities. Each NASA installation maintains its own source file of information regarding the capabilities and products or services of companies expressing an interest in doing business with that installation.

When a procurement need arises, a bidder list is prepared based on information in the files and other available information, and a copy of the solicitation is sent to enough companies on the list to be reasonably sure of adequate competition, appropriate to the size and nature of the procurement. (It is important to note, however, that all companies on the list are not necessarily notified of the procurement.) Installations may also use other source files as necessary, such as the Small Business Administration's Procurement Automated Source System (PASS) or the Minority Business Development Agency's PROFILE System. Instructions regarding procedures for submitting information to these agencies as well as to each NASA installation are contained in Chapter 3.

The *Commerce Business Daily* (CBD) is the official announcement medium for Federal procurements. When the anticipated value of the contract exceeds $25,000, a notice of the pending procurement is normally placed in the Commerce Business Daily at least fifteen days prior to issuance of the solicitation. A copy of the solicitation is sent to companies requesting it on a first-come, first-served basis, until the supply is exhausted. Information on contract awards and other significant Government business

Procurement Method

Sealed Bids = IFB = Primarily Selected on Price

Competitive Proposals = RFP = Selected on price, technical capabilities and other factors

announcements are also included in the Commerce Business Daily. A subscription to this publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

Another source of information on NASA procurements is the bid room. Each NASA installation maintains a bid room in which all of its current solicitations are available for inspection by prospective contractors.

NASA Headquarters Small Business Office in Washington, DC maintains a Central Bid Room which stores open solicitations and Commerce Business Daily Announcements of forthcoming procurement actions which are issued by NASA facilities outside the metropolitan Washington, D.C. area.

Procurement Method

One of the first decisions made by the contracting officer is whether the procurement will be conducted using sealed bids or competitive proposals. The distinction between these two methods does not relate to the manner in which they are publicly announced, nor the extent of competition for contract awards. The primary difference between sealed bidding and competitive proposals is the way the responses to the solicitation from prospective contractors are evaluated.

Sealed Bidding

The main criterion for evaluating a response to a procurement utilizing sealed bids is price. In such procurements, the specifications or exact performance requirements can usually be clearly stated, required delivery dates are known, and the contract is simply awarded to the lowest qualified bidder.

Sealed bid procurements are particularly appropriate in supply type contracts for the purchase of standard commercial items. A solicitation under this procurement method is called an Invitation for Bids (IFB), and the response is a *bid*. The rules and procedures for submitting and evaluating bids in response to an IFB are very rigid. Likewise, the performance of the contract by the successful bidder must adhere strictly to the stated specifications and the agreed upon price. (For example, an increase in materials or production costs could not be passed along to the Government.)

Although sealed bidding is the preferred method of awarding contracts, NASA's heavy emphasis on research and development normally requires a more flexible contracting approach. Consequently, most NASA procurement dollars are spent utilizing competitive proposals.

Competitive Proposals

It is important to understand that solicitations using competitive proposals are normally just as widely announced and maximum competition is sought just as it is in sealed bidding. The key difference between the two methods is that competitive proposals allow for consideration of factors other than price, such as the technical capabilities of the prospective contractor and the anticipated effectiveness of the proposed approach to performance. A solicitation for competitive proposals is called a Request for Proposals (RFP), and the response is a *proposal*. This method is very useful for awarding research and development contracts, which comprise the bulk of NASA procurements, because exact requirements and associated costs cannot normally be specified in advance.

The selection process when competitive proposals are requested generally involves evaluation of proposals to determine which offerers are in the competitive range (i.e., have a reasonable chance of being selected), negotiations or discussions with firms in the competitive range, selection of the successful offerer, and final negotiation with that company prior to award of the contract.

The evaluation of proposals is often performed by a Source Evaluation Board consisting of a group of NASA officials familiar with both procurement proce-

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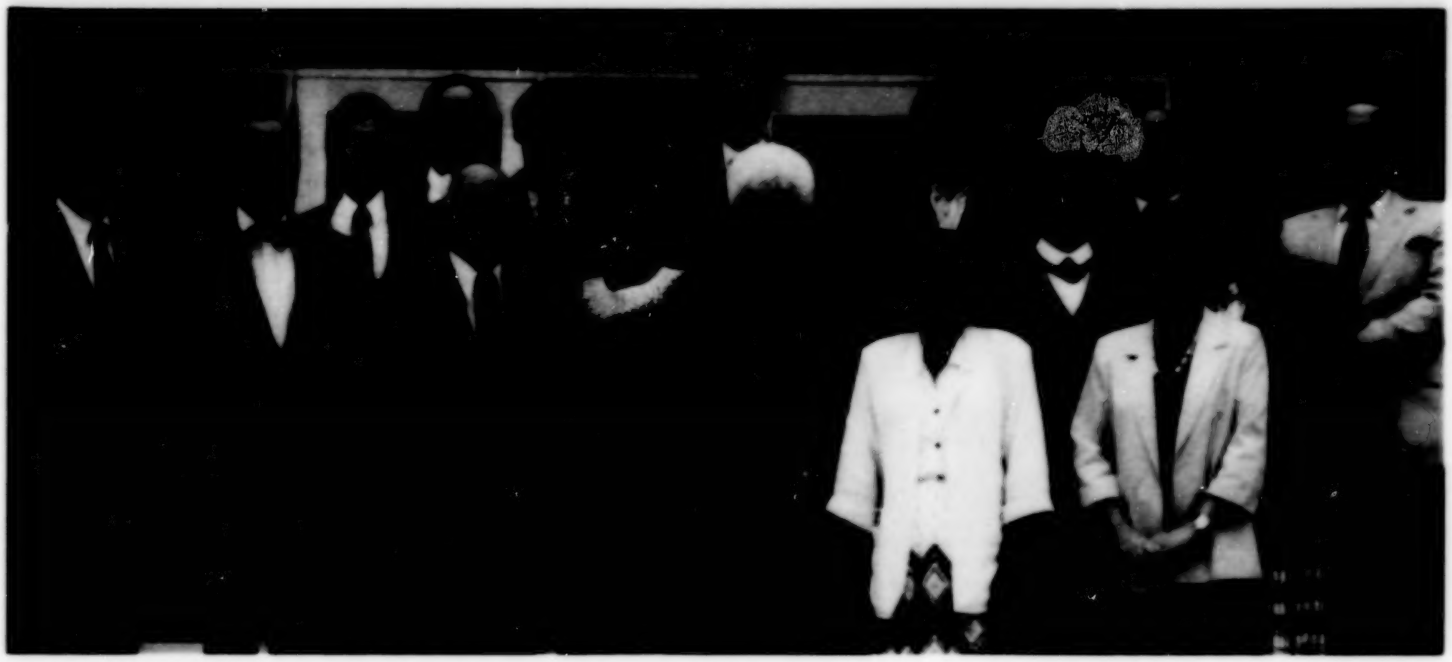

Small and Minority Business Specialists are available at each installation to assist vendors in all phases of NASA procurement.

dures and the technical requirements of the Request for Proposals. A detailed description of this evaluation-selection process is contained in the NASA Source Evaluation Board Handbook.

Construction Contracting

Although contracting for construction is in many ways similar to other procurements utilizing sealed bids, there are some unique aspects of which prospective contractors in this field should be aware. One of the most important aspects is the requirement for bonding. Under the provisions of the Miller Act, NASA construction contractors are required to post performance and payment bonds on contracts in excess of $25,000 to protect the Government's interest in the proper and timely completion of the work, and to secure payment for labor and material furnished under the contract.

Small construction firms which may experience difficulty in obtaining a bond should inquire into the surety bond program administered by the Small Business Administration.

Special bid forms (and in some cases bid guarantees) and site inspections are additional unique aspects of construction contracting. Firms which are unfamiliar with bidding on Government construction jobs are encouraged to meet with appropriate personnel at the nearest NASA installation for a more detailed explanation of the requirements. An installation's Small Business Office will assist in arranging such appointments if requested.

Architect-Engineer Contracting

Selection of Architects and Engineers (A&E) is accomplished through an Architect-Engineer Selection Board at each NASA field installation in support of a full range of facilities and construction management activities. The Board reviews the qualifications of firms interested in performing A&E work in connection with NASA construction projects. In the case of procurements estimated to cost more than $10,000, the Board conducts oral or written discussions with a minimum of three firms. The Board submits a report to the installation Director recommending, in order of preference, those firms considered best qualified to perform the services required.

Upon approval by the installation director of the list of qualified architect and engineering firms, contract negotiations are conducted with the firm given first preference. If a mutually satisfactory contract cannot be agreed to, negotiations are then initiated with the firm given second preference on the list. Generally, this procedure continues until a contract has been negotiated.

Pursuant to 10 U.S.C. 2306(d), the contract amount that may be paid to an architect-engineer for the production and delivery of the design, plans, drawings, and specifications may not exceed six percent of the estimated cost of the related construction project, exclusive of the amount of such fee.

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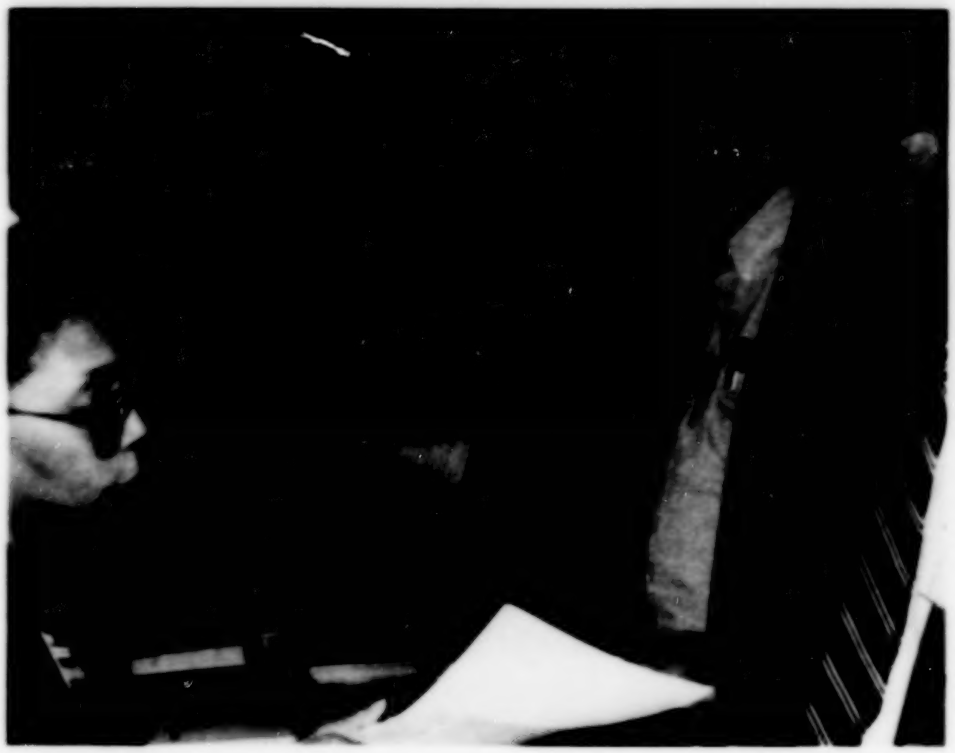

NASA Small Business Specialists assist contractors in understanding the process of doing business with the Agency.

Since each Architect-Engineer Selection Board maintains a list of qualified firms for various types of projects, A&E firms should file Standard Form 254 (Architect-Engineer and Related Services Questionnaire) with the various NASA field installations and with the NASA Headquarters, Facilities Engineering Office. Firms are encouraged to keep their A&E qualification information current, preferably on an annual basis. Firms may also be required to file Standard Form 255 (Architect-Engineer and Related Services Questionnaire for Specific Project) when additional information is needed on a particular project.

Additional Contracting Considerations

There are many requirements which prospective contractors must meet or agree to prior to being awarded a NASA contract. Some of the more important of these are in the areas of equal opportunity; procurement integrity; reliability, maintainability and quality assurance; safety and health; industrial relations; and security. Other representations and certifications may also be required. Questions in this area should be addressed to the contracting officer identified in the solicitation package.

Equal Opportunity

Pursuant to Executive Order 11246, as amended, and the rules and regulations of the Department of Labor, a standard "Equal Opportunity" clause is prescribed for use in all nonexempt contracts in excess of $10,000. Under this clause, the contractor or subcontractor is obligated not to discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, and is required to take affirmative action to ensure equal employment opportunity. A bidder or offerer may be required to include a representation concerning the filing of compliance reports in accordance with the Equal Opportunity clause in his/her bid or proposal.

Additionally, Executive Order 11141 and the Age Discrimination in Employment Act of 1967, prohibit discrimination on the basis of age. Further, the Rehabilitation Act of 1973, as amended, and Executive Order 11758 cover nondiscrimination standards with respect to the handicapped. The Vietnam-era Veterans Readjustment Act of 1974, as amended, prescribes affirmative action requirements in the employment and advancement of qualified disabled veterans and veterans of the Vietnam era.

An Equal Opportunity Officer is available at each NASA installation to assist prospective contractors in understanding and meeting the equal opportunity requirements.

Procurement Integrity

Before a bidder or offerer may receive a contract award, the company official preparing the bid or offer will be asked to certify as to his/her knowledge of any violation of procurement integrity occurring during the conduct of the procurement. Violations include (1) discussing or promising future employment or business opportunity to an agency official involved in the procurement, (2) offering money, gratuities, or other things of value to an agency procurement official, and (3) soliciting or obtaining, directly or indirectly, from an agency officer or employee (including contractors assisting the agency in its procurement) proprietary or source selection information regarding the procurement.

Reliability, Maintainability and Quality Assurance

NASA tailors reliability and quality assurance requirements for each contract to achieve effectively reliability and quality commensurate with mission objectives.

For space systems and their major elements, contractors are required to operate reliability and quality programs in accordance with NASA publications NHB 5300.4(1A-1), *Reliability Program Provisions for Aeronautical and Space System Contractors*, NHB 5300.4(1B), *Quality Program Provisions for Aeronautical and Space System Contractors*, NHB 5300.4(1E), *Maintainability Program Requirements for Space Systems*, NHB 5300.4(1F), *Electrical, Electronic, and Electromechanical (EEE) Parts Management and Control Requirements for NASA Space Flight Programs*, or selected provisions of these publications. Major subcontractors will invoke the same requirements.

Direct NASA contracts and lesser subcontracts will invoke selected provisions of NHB 5300.4(1C) "Inspection System Provisions for Aeronautical and Space System Materials, Parts, Components and Services."

For the Space Transportation System/Space Shuttle Program, contractor programs may have to meet the requirements of NHB 5300.4(1D-2), *Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program* and NHB 1700.7Am, *Safety Policy and Requirements for Payloads Using the Space Transportation System.*

Other NASA, military or Federal specifications will be invoked as appropriate to the hardware involved. Copies of these publications may be obtained from the NASA installation inviting bids/proposals.

Safety and Health Program

NASA's policy is to take all practical steps to avoid loss of life, personal injury or illness, and loss of property. Specific requirements to implement this policy are found in each contract and are intended to preclude loss. In all contracts the applicable Occupational Safety and Health Act Standards are invoked. Other Federal as well as industry standards may also be included for specific areas of concern. Given the critical nature and high value of NASA operations, strict adherence to contract safety and health provisions is mandatory and will be subject to thorough evaluation during the life of the contract.

Industrial Relations

Labor relations are an important factor in contract performance. NASA has a labor policy of neutrality, and the union or nonunion status of a bidder is not a scored factor in the evaluation of proposals and the award of contracts. The bidder's assessment of labor costs may be affected by the local relations, environment, applicable labor agreements, and Department of Labor wage rate and fringe benefit determinations. Accordingly, bidders should be particularly aware of potential obligations resulting from legal precedents applicable to successor contracts.

Security Clearance

Should a requirement set forth in a NASA contract or solicitation require access to classified information, an industrial security clearance will be required. The procurement solicitation will cite this requirement when necessary. As a participant in the Department of Defense (DoD) Industrial Security Program, NASA (when the security requirement exists) will request the Department of Defense to process the company's application. Specific inquiries may be addressed to the procuring NASA activity. Further procedures and requirements are set forth in the "Industrial Security Manual for Safeguarding Classified Information" (DoD 5220.22M). This document may be purchased from the Superintendent of Documents.

Contract Administration

Once a contract award has been made and performance has started, the Government begins the process of contract administration. Contract administration is the responsibility of the contracting officer, but certain functions may be delegated by interagency agreement to cognizant agencies of the Department of Defense (such as the Defense Contract Management Command and the Defense Contract Audit Agency).

There are many accounting, reporting and other contractual requirements associated with performing on Government contracts, the delineation of which would be outside the scope of this publication. However, prospective contractors should be absolutely sure that all of these requirements are well understood prior to acceptance of a Government contract. NASA field installation small business offices will assist companies seeking advice in this regard upon request.

CHAPTER 3

The U.S. Federal Government is the largest purchaser of goods and services in the world. According to the U.S. Office of Federal Procurement Policy, U.S. Federal agencies contracted $191 billion (20 million actions) in Fiscal Year 1990. Despite this enormous expenditure, however, Government contracts are not easily obtained—competition is fierce. All firms, and particularly small companies, are finding it increasingly necessary to seek out contracting opportunities aggressively. This process requires perseverance, patience, and good business skills and judgment. The most successful companies are generally the ones which have mastered effective marketing techniques for winning contracts, and subsequently followed through with competent contract performance.

This chapter is designed to be a primer on how to market to NASA. While the information presented is specific to NASA, many of the principles are applicable to other agencies as well. It is hoped that the following information will provide useful guidance in the development of a productive marketing program.

Marketing Your Capabilities

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Nature of the Market

Total NASA procurements with business firms totalled $10.1 billion in FY 1990, with thousands of companies participating in the process. As a first step in selling to NASA, prospective contractors should become familiar with the predominant types of goods and services NASA buys, the locations at which they are bought, and the aggregate dollar volume of purchases in a given area.

Careful consideration needs to be given to what extent NASA represents a viable market for any particular firm; in other words, how close is the match between a firm's capabilities and NASA's needs? It is important not to expend too much marketing effort in cases in which the prospect of a contract does not appear likely. This is particularly true for small companies, which normally have very limited resources for marketing. The general technical program descriptions presented in Chapter 5 may be useful in gaining a better understanding of NASA's procurement activities on a broad scale. Additionally, the Small Business Specialist at each field installation can often provide useful guidance regarding a firm's prospects for doing business with that installation.

Another useful source of procurement information is NASA's *Annual Procurement Report*. Summary data are presented on all procurement actions for the preceding fiscal year, with numerous tabulations reflecting awards to small versus large businesses, competitive versus noncompetitive awards, and new contracts versus contract modifications. A list of the one-hundred largest contractors according to net value of direct contract awards from NASA is also included. Although the report describes the preceding year's procurement statistics, it is a good general guideline for approximating near-term future expenditures. The most recent *Annual Procurement Report* is available from NASA Headquarters, Office of Procurement, Mail Code HM, Washington, DC 20546.

Effective marketing of a firm's capabilities is essential in the Government market, just as it is in the private sector.

Once a company determines that NASA represents a viable market, there are several approaches that can be simultaneously pursued to increase the likelihood of finding specific procurement opportunities.

The Solicitation Mailing List

As mentioned in Chapter 2, NASA often uses an internal source list to identify potential bidders for a procurement. Because every NASA installation maintains its own list, it is essential to apply individually to each installation with which a company hopes to do business. The application consists of a Standard Form 129, which generally describes the company as well as more specific information regarding the products and/or services a firm provides. There are special forms for architect and engineering firms. The tear-out card at the back of this publication may be used to request application forms for each NASA installation.

In most cases, prospective contractors should also submit bidders mailing list applications to other Government agencies active in their field of interest. Information on appropriate procedures is normally available from each agency's small business office. Two Governmentwide lists of particular interest are the Small Business Administration's Procurement Automated Source System (PASS), and the Minority Business Development Agency's (MBDA) PROFILE System.

PASS is used by many agencies to supplement their in-house lists, and all small businesses are invited to be included in the system. PROFILE is also used Governmentwide but is limited to minority-owned companies. Further information on PASS may be obtained from the nearest Small Business Administration office; information regarding PROFILE is available from any Minority Business Development Agency Regional Office (see Chapter 6).

Firms which market standard commercial products likely to be used by several Government agencies should also be sure their products are included on the Federal

Supply Schedule. The Schedule is updated annually, and application procedures may be obtained from the General Services Administration Business Service Centers described in Chapter 6.

It is important to respond to every solicitation received as a result of being on a bidders list, even if no bid or proposal is offered. A simple post-card or letter indicating "no bid" will suffice. Otherwise, a firm might be dropped from the list without notice. Likewise, it is advisable to keep a record of addresses to which applications have been sent, so they may be updated as the need arises.

Review the Commerce Business Daily

Because there are sometimes more companies in NASA's source system than are necessary to achieve adequate competition, it is not safe for a company to assume that because it is listed in the system it will be notified of every procurement in its field. However, by reviewing the *Commerce Business Daily* (CBD)) each day, firms can identify interesting solicitations as they are issued, and request copies of those on which they would like to bid. Generally, all procurements over $25,000 are synopsized in the CBD. *It is almost essential for any company seriously interested in marketing to the Government to regularly review the CBD.* Subscriptions may be obtained from the Superintendent of Documents, and the publication is also available in most public libraries.

Direct Marketing

One of the most productive techniques for identifying procurement opportunities within NASA is via direct contact with technical requirements personnel. Although this can be somewhat expensive and time-consuming, and does not in any way guarantee a contract or influence the competitive selection process, it does enable contractors to develop an early and thorough understanding of NASA's requirements. This is especially important in research and development, where long-range planning and the allocation of a company's resources are essential.

NASA's technical and procurement personnel welcome inquiries and discussions with appropriate company representatives. The Small Business Office at each Center will be pleased to arrange such visitations or respond to written inquiry.

The annual Research and Technology Objectives and Plans Summary and the NASA Program Plan described in Chapter 5 are additional valuable sources of information for determining technical areas of interest and who to contact within NASA. Inquiries of a general nature or inquiries with NASA-wide implications should be addressed to the Director, NASA Office of Small and Disadvantaged Business Utilization, Washington, DC 20546.

Broad Agency Announcements

In addition to the types of solicitations, Invitations for Bids, and Requests for Proposals described in Chapter 2, NASA uses broad agency announcements called Announcements of Opportunity (AO's) and NASA Research Announcements (NRA's).

Announcements of Opportunity are used to acquire investigations which may involve special instruments to be flown aboard NASA aircraft or spacecraft. They describe the general nature and schedule of flights and invite investigator-initiated research proposals.

NRA's announce NASA's interest in research areas and invite proposals. Selection of proposals for funding is made following peer or scientific review using evaluation criteria in the NRA. Peer or scientific review involves evaluation outside NASA by discipline specialists in the area of the proposal or evaluation by in-house specialists or both.

The availability of both types of announcements, AO's and NRA's, is publicized in the *Commerce Business Daily*.

Getting on Solicitation Mailing Lists by submitting forms such as these is a very important step in the marketing process.

The announcements are available from the offices listed in the CBD. Requests to be placed on the mailing list for these announcements should be addressed to NASA, Office of Space Science and Applications, OSSA Steering Committee, Code SPS, Washington, DC 20546.

Proposals

The preparation of an effective proposal is perhaps the most important part of the marketing process. As a general rule, companies not familiar with preparing proposals for Government contracts should seek professional assistance, appropriate to the complexity of the procurement and its potential value to the company. University or private consultants and, in some cases, local business assistance centers, are possible sources of such assistance. Many universities also teach evening courses or sponsor seminars on preparing proposals. It is well beyond the scope of this publication to present thorough guidelines on this complicated subject. However, the following information may be useful to acquaint firms which are inexperienced in Government contracting with some very basic requirements.

Preparing Proposals

First and foremost, the instructions as stated in the solicitation must be followed exactly. Extreme care should be taken to fully respond to every requirement in the exact detail called for. Delivery quantities, dates, terms, conditions, product specifications, company representations, certifications, acknowledgments, signatures and everything else requested in the solicitation must be provided in the proper format. The proposal or bid must be submitted on time. Technical proposals, which are typically required in NASA procurements, must adequately address each issue identified in the request for proposals. It is imperative to remember that the selection process only allows for consideration of what is properly presented in the proposal or bid, and does not consider outside factors, no matter how obvious.

The relative lack of flexibility in Government procurement, even under negotiated contracting procedures, is often difficult for inexperienced contractors to understand. Many contracts have been lost because a bid arrived as little as one minute too late, or because a proposal failed to sufficiently respond in an area where it was obvious the company had substantial expertise. Nevertheless, the procurement regulations have been established to ensure fair and equitable treatment for all companies bidding on Government contracts, and are therefore rigidly enforced without exceptions for "extenuating circumstances."

All questions regarding a specific procurement should be addressed to the contracting officer identified in the solicitation. Although it may seem more convenient or direct to seek guidance from the technical project office, the contracting officer is the only official authorized to represent the Government in procurement matters.

Copies of NASA publications and technical specifications when referenced in solicitations and contracts may be obtained through the NASA contracting office. Other sources for Federal or military specifications are contained in the *Index of Federal Specifications and Standards*, and the Department of Defense *Index of Specifications and Standards*. These documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

All firms, but particularly small firms with limited resources, should be judicious regarding the solicitations on which they bid. The process of preparing a high quality proposal is expensive and time consuming, especially in the R&D procurements frequently sought by NASA. Firms generally stand a better chance of obtaining a contract by emphasizing proposals on projects closely aligned with their capabilities, as opposed to trying to "blanket the market" by bidding on everything remotely related to their field. While this latter approach may eventually lead to an award, it is more likely to result in a series of unproductive and frustrating experiences for both NASA and the contractor.

In the event that a firm submits an unsuccessful bid or proposal, it has the right to know why. It is NASA policy that on written request, unsuccessful offerors will be debriefed after contractor selection has been announced, but normally prior to contract award. In sealed bid procurements, in which selection is predominantly based on price, debriefing is essentially accomplished at the public bid opening. The request for debriefings or attendance at bid openings should not be regarded as establishing an adversarial relationship between NASA and the contractor; rather, it is an important part of the learning process which enables a company to submit a better proposal the next time. Small, inexperienced firms should make a special effort to understand the weaknesses in their proposals to become more competitive in future procurements.

Unsolicited Proposals

Although most NASA R&D contracts are awarded via standard competitive procurement procedures, another important method of doing business with NASA is through the submission of relevant new ideas and concepts in the form of unsolicited proposals. An unsolicited proposal is a written offer to perform a task or effort, prepared and submitted by an organization on its own initiative without a formal solicitation from NASA. In general, the unsolicited approach is most appropriate for research of a fundamental nature which bears potential for advancing the state of the art in a particular area, contributes to knowledge of a specific phenomenon, or provides fundamental advances in engineering or the sciences. In addition, proposals may define problems and present possible solutions to the problems, developmental or otherwise, which are within NASA's areas of concern.

When an organization wishes to pursue a specific research project, it is advisable to determine if the contemplated study is within NASA's scope of interests, through such sources as the open literature, published General Services Administration testimony before Congressional Committees, or direct contacts with NASA technical personnel. However, the existence of an apparent mutual interest does not, in itself, mean NASA will support an unsolicited proposal. NASA must consider such additional factors as the technical merits of the proposal, the availability of funds, and the relative priority of the project as compared with other alternatives under consideration.

Proposers should be aware that in most cases cost sharing by non-Federal organizations is statutorily required in any contract for research that results from an unsolicited proposal. However, exceptions for educational institutions and other organizations are possible in certain circumstances.

Guidelines for the preparation and submission of unsolicited proposals may be obtained by writing to the Small Business Specialist at any NASA installation.

CHAPTER 4

The primary objective of Government procurement is to obtain required goods and services at a fair price. In many cases, however, other objectives are simultaneously achieved. To ensure that all businesses have an equitable opportunity to participate in Federal procurement, a number of special assistance programs have been established. These include various types of preference programs, such as small business set-asides and programs exclusively for minority-owned companies, as well as other forms of assistance generally designed to help companies that otherwise might not be able to compete for a share of Government contract awards. All firms are encouraged to become familiar with and take advantage of any of the special assistance programs for which they qualify. This chapter is intended to be an introduction to some of the major programs primarily available to small and disadvantaged businesses.

Special Assistance Programs

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Small Business Set-Asides

Early in the acquisition process, all proposed NASA procurements are reviewed for the participation of small businesses. A business qualifies as being small if it, including its affiliates, is independently owned and operated, is not dominant in the area of business in which it is bidding on Government contracts, and meets certain other size-standard criteria established for each industry by the Small Business Administration (SBA). Size standards are published in the regulations of SBA (Title 13, CFR Part 121). Automatically, procurements of $25,000 and under which are subject to small purchase procedures are reserved exclusively for small businesses. In addition, certain classes of acquisitions are frequently set aside for bidding by small business concerns, based on past experience with particular items. Often, individual procurements are also set aside when it appears that adequate competition would result if bidding on the required goods and services was limited to small businesses.

In some instances, portions of large procurements may be set aside for exclusive small business bidding. The extent, if any, to which individual procurements are set aside and the applicable size standard are indicated in both the solicitation document and in the *Commerce Business Daily* announcement. Even if a procurement is not set aside, small firms are encouraged to compete and are included on the source list for each competitive solicitation when their capabilities so indicate.
indicate.

Small companies are encouraged to visit with NASA Small Business Specialists to describe their capabilities and learn about special assistance programs for which they qualify.

Minority Business Enterprise

NASA's Minority Business Enterprise Program is directed toward ensuring the equitable participation of minority firms in NASA prime and subcontract opportunities. In keeping with national policy, NASA works closely with the Small Business Administration (SBA) in assisting small firms owned and controlled by socially and economically disadvantaged individuals.

The term socially disadvantaged individuals, for Government procurement purposes, include (but are not limited to) Black Americans, Hispanic Americans, Native Americans, Asian Pacific Americans, Asian Indian Americans and other minorities, or any other individual as designated by the SBA.

The term economically disadvantaged individuals relates to the assets and net worth of individuals as well as their relative access to capital and credit opportunities, as prescribed by the SBA. Under the provisions of Section 8(a) of the Small Business Act, the SBA may enter into contracts with NASA and other Government agencies for supplies and services, and then subcontract for these requirements with SBA-approved small disadvantaged firms. NASA gives special emphasis to identifying procurement requirements for referral to the SBA for matching with the capabilities and potential of approved Section 8(a) firms. Qualifying firms interested in participating in this program should contact the nearest Small Business Administration office, in addition to making their capabilities known to NASA.

Labor Surplus Area Set-Asides

Under this program, competition for contracts is restricted to firms with production facilities in labor-surplus areas (areas of higher than average unemployment) even if their headquarters is not located in such areas. The firms must agree to perform most of the contract work in the labor surplus areas. Contracts are set aside when enough qualified firms are expected to bid to ensure that awards will be made at fair and reasonable prices.

The U.S. Department of Labor defines and classifies labor surplus areas. For current information on qualifying areas, consult the publication, *Area Trends in Employment and Unemployment*, available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

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NASA is interested in expanding its source lists to include more women-owned firms with technical expertise.

Small Disadvantaged Businesses

Public Law 101-144, dated November 9, 1989, and a modified provision contained in Public Law 101-507 require that NASA award a minimum of 8 percent of the total value of prime and subcontracts—including the Space Station by the time operational status is obtained—to small business concerns or other organizations owned or controlled by socially and economically disadvantaged individuals, including women, Historically Black Colleges and Universities, and minority educational institutions.

In an effort to achieve the 8-percent goal, NASA plans to maximize its outreach to the minority business community by implementing new initiatives as well as by vigorously continuing to support ongoing efforts.

The NASA Office of Small and Disadvantaged Business Utilization works collaboratively with the Office of Equal Opportunity Programs to ensure the participation of Historically Black Colleges and Universities and minority educational institutions. This process includes collaboration between the respective functional entities of equal opportunity, minority universities, and small disadvantaged businesses at each NASA installation.

Women-Owned Businesses

Public Law 100-533 dated Oct. 25, 1988, requires Federal agencies to take affirmative action in support of businesses owned by women. To carry out this order, NASA makes special efforts to advise women of business opportunities and preferential contracting programs for which they may be eligible. Bidder mailing lists are reviewed to ensure a fair representation of women-owned firms, and special conferences are sponsored to assist companies owned and controlled by women in the process of doing business with NASA.

Subcontracting Opportunities for Small Businesses

Subcontracting with NASA prime contractors is an important source of revenue for many companies, both small and large. For example, of the $10.1 billion awarded to prime contractors in FY 90, $4.3 billion was channeled on to subcontractors, with over $1.4 billion going to small businesses. Typically more than half of the total NASA dollars flowing to small businesses have been awarded via subcontracts. Thus, the development of sound marketing strategies to seek out subcontracting opportunities should be an integral part of a company's overall plan to sell to the Government.

Recognizing that small firms often do not have the capability to perform as a prime contractor on the larger procurements, NASA actively promotes the involvement of small businesses at the subcontract levels. Special contract clauses are included in most NASA prime contracts to maximize small business and minority business subcontracting opportunities. Small business firms are therefore encouraged to identify their capabilities to NASA's major prime contractors.

There are several useful sources of information to assist small businesses in determining the appropriate prime contractors to contact. One of the best is the *Commerce Business Daily* (see Chapter 3), which publishes information on unclassified contract awards exceeding $25,000 in value. The Small Business Administration and the Department of Defense publish directories of major Government contractors that appear to offer the greatest potential for subcontracting to small business concerns. In its *Annual Procurement Report*, NASA also publishes a list of the top 100 contractors ranked according to the amount of NASA contract awards. tract awards.

Most of the major prime contractors have small business representatives assigned to assist small companies in understanding and responding to the needs of prime contractors, and many produce special publications that can be helpful. Finally, the Small Business Specialist at each NASA installation will provide guidance to small businesses seeking subcontracting opportunities.

Minority University Research and Education Program

NASA's Minority University Research and Education Program is designed to cultivate research ties with universities having significant numbers of minority faculty members and students whose research and business interests are compatible with NASA's programs and subcontractor activities in space science and aerospace technology.

NASA's mission includes all matters pertaining to the civilian space and aeronautical research activities of the Nation. Its work includes basic and applied research for the expansion of human knowledge of phenomena in the atmosphere and space; the improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles; the development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space; and, most importantly, the preservation of the role of the U.S. as a leader in space technology, aeronautics and a myriad of other space activities within the outside atmosphere.

As we approach the 21st century, leadership in space takes on a new significance. NASA's partnerships with minority universities will enable the preservation of the strong leadership and the technical foundation which has been forged by more than thirty years of extraordinary space exploration by NASA.

While NASA's mission is largely accomplished through its research and flight centers, the agency has been assisted in its endeavors by the exemplary teamwork of academia, including Historically Black Colleges and Universities (HBCU's) pursuant to Executive Order 12677 and Other Minority Universities (OMU's) pursuant to Executive Order 12729.

The initiatives and cooperation of the NASA center directors, staff, managing scientists and engineers and principal investigators at the HBCU's and OMU's result in projects mutually beneficial to NASA and the universities. NASA strongly supports the direct involvement of students in research and training efforts to ensure that minority students gain additional motivation for research careers and minority universities participate in all aspects of NASA's ongoing activities and programs.

NASA encourages responses to NASA Announcements of Opportunities, collaboration and alliances with minority and other major NASA contractors, as well as the submission of scientifically and technically robust unsolicited proposals by universities in an effort to further the Agency's mission.

The unsolicited proposal is the prime assessment mechanism by which the university is able to match its research capabilities and interests with NASA research needs to meet NASA's mission. Proposals are evaluated on the basis of: (1) their intrinsic scientific and engineering merit, (2) their potential contribution to NASA's mission, and (3) availability of funds. NASA supports accepted projects through single- or multiyear grants, through cooperative agreements or contracts.

Individuals at universities contemplating the development of a proposal for submission to NASA may wish to review the *NASA Research and Technology Objectives and Plans (RTOP) Summary*, a compilation of research currently in progress throughout NASA. By using the RTOP to determine and to identify the Agency's research needs and its technical monitors, minority university researchers can initiate communications with NASA technical personnel prior to and throughout the proposal development process. process.

NASA also encourages partnerships between Historically Black Colleges and Universities and the private sector as a means to further strengthen the minority university infrastructure through joint funding and sharing of resources. In addition, out-placement opportunities exist for students through the minority universities' increased relationships and exposure to the private sector.

The NASA Minority University Research and Education Program has established a new Research Center component, which will enhance the capability of Historically Black Colleges and Universities to participate in mainstream research. NASA will provide eight $1-2 million/year awards that HBCUs can use to leverage funds from other Federal agencies, states, industry, foundations and other organizations to enhance their core research capabilities in aerospace research and development.

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NASA
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NASA Tech Briefs
Earth's Vanishing Ozone
A View To The Future

NASA Tech Briefs can be a valuable source of information and new product ideas for small companies.

Information regarding all of the programs described in this section may be obtained from the Director, Minority University Research and Education Programs, Office of Equal Opportunity Programs, NASA Headquarters, Mail Code EU, Washington, DC 20546.

Procurement Conferences

NASA is an active participant in the Federal Procurement Conference Program sponsored by the Department of Commerce predominantly to assist small businesses. At these conferences NASA representatives counsel many of the participants on a one-to-one basis. In addition, there are follow-ups between NASA representatives and the small businesses to assist them in their marketing with appropriate NASA technical personnel. NASA Small Business Specialists at all of the Field Centers also work very closely with the local Chambers of Commerce and trade associations to advise them of NASA's needs and to aid interested firms in informing NASA of their capabilities and expertise.

Other Forms of Assistance

While the following programs are not related to procurement assistance, per se, in many cases they offer special or unique opportunities which are advantageous to small businesses.

Rights to Inventions and Data

The rights to inventions made under NASA contract, and the licensing of NASA patents are governed by statute with special consideration given to small businesses. In general, a nonprofit organization or small business firm may elect to retain title to inventions made in the performance of work under a U.S. Government contract. Inventions made by larger business firms in the manner specified by the Space Act, on the other hand, become the exclusive property of the Government unless the NASA Administrator determines that the interests of the U.S. will be served by waiving all or any part of the Government's rights. In all cases, full disclosure to NASA of inventions funded by the agency is required.

It is NASA's general policy to acquire for the Government unrestricted rights to all data first produced under NASA contracts. Under certain circumstances, NASA may grant the contractor the right to copyright such data, reserving a free license under the copyright to the Government.

Detailed information concerning these policies and procedures, as well as guidelines for petitioning for waivers of rights to contract inventions, and for making application for licenses under NASA patents, are available from the Office of General Counsel, National Aeronautics and Space Administration, Washington, DC 20546.

Monetary Awards

Although not limited to small businesses, Section 306 of the Space Act of 1958 authorizes the Administrator of NASA to make monetary awards to individuals or organizations for scientific or technical contributions "having significant value in the conduct of aeronautical or space activities." Such contributions include inventions and innovations which have been used and have proved to be of verifiable value to NASA. Many qualified contributions have been produced during the performance of contracts for NASA. For information concerning the criteria for eligibility and the procedure for submitting an application for award, write to Staff Director, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, DC 20546.

Access to Technical Information

The results of NASA research and development can often be applied by small businesses in unique and profitable ways.

Scientific and Technical Information Program

NASA's Scientific and Technical Information (STI) Program provides access to the entire body of the published results of work undertaken by NASA researchers and engineers, and their contractors and grantees. In addition, the STI Program scans the worldwide aerospace literature base, and catalogs bibliographic information for NASA and the U.S. aerospace community. This includes providing technical translations in up to 34 languages. The principal products of this effort are identified below, and more information about them can be obtained from the NASA Center for Aerospace Information, P.O. Box 8757, Baltimore, MD 21240, (301) 621-0100.

- NASA/RECON — NASA's online retrieval system uses both high-speed communication lines and dial-up networks. It is the only system that allows comprehensive searching of the entire NASA data base.

- Search Requests — Timely response is made to special requests to NASA/RECON searches from contractors and others.

- *Scientific and Technical Aerospace Reports* (STAR) — This publication provides domestic and international reports and bibliographic information twice a month.

- International Aerospace Abstracts — This publication provides domestic and international open literature and bibliographic information twice a month.

Numerous new products, processes and solutions to technical problems have been discovered and are available for further development. This information is distributed by NASA's Technology Utilization Programs in several forms:

NASA Tech Briefs

NASA Tech Briefs is an indexed monthly journal containing articles on innovations and improved products or processes developed for NASA which are thought to have commercial potential. Articles are grouped into ten broad technical categories, and special sections are included for books and reports, (computer programs) and new product ideas. Information on NASA's patent licensing program and additional services of the Technology Utilization Program are also described. *NASA Tech Briefs* is currently distributed free to qualified companies. Requests may be directed to the address at the end of this section.

Industrial Applications Centers

Ten Industrial Applications Centers (IAC) have been established by NASA to assist small businesses and the non-aerospace industrial sector in making profitable use of new knowledge resulting from aerospace research and development. Each IAC is based at a university or not-for-profit research institute, and is staffed with specialists skilled in the use of computer search and retrieval techniques. A modest fee is charged for a variety of services offered to IAC clients. The NASA Industrial Applications Centers network is also affiliated with many State-sponsored businesses and technical assistance centers located at universities nationwide which are able to assist small businesses with access to useful technologies available from NASA as well as other Federal agencies.

Computer Software and Management Information Center

The Computer Software and Management Information Center (COSMIC) is located at the University of Georgia. COSMIC collects all of the computer programs NASA has developed (and also some of the best programs developed by other Government agencies), verifies that they operate properly, and makes them available at very reasonable prices. Program documentation is also available for evaluation of programs prior to purchase. A complete catalog of computer programs offered by the Computer Software and Management Information Center may be be purchased, or individual searches for relevant programs will be performed upon request.

More information on the services and elements of NASA's Technology Utilization Program may be obtained by writing to the Director, Technology Utilization Division, Office of Commercial Programs, NASA Headquarters, Washington, DC 20546.

CHAPTER 5

Most of NASA's purchases are made by the procurement offices of its field installations. For example, in FY 1990 these offices accounted for 94 percent of the total procurement dollars spent with business. Each NASA installation purchases a wide variety of components, materials, services and construction in support of its research and development and operational activities. Support services include security, fire protection, buildings and grounds maintenance, logistics support, management and administrative services, computer services and software, graphics and photography, aircraft maintenance, library and technical documentation, communications, custodial and other services. It is important, therefore, for companies marketing to NASA to become familiar with the activities and needs of each installation with which it hopes to do business. This is especially true for technical or research and development firms. While all NASA Centers buy similar everyday items associated with office operation, facilities maintenance and construction, etc., the technical procurement requirements of each installation vary widely. This chapter briefly summarizes the major research programs and fields of interest at individual NASA Centers.

NASA Field Installations

Lewis Research Center
NASA Headquarters
Kennedy Space Center
Marshall Space Flight Center
Stennis Space Center

Over 94 percent of NASA's procurement dollars are spent by its field installations located throughout the country.

Summaries of Research Interests

NASA publishes an annual compilation of its funded research and technology programs in abstract form as the Research and Technology Objectives and Plans Summary (RTOP). The RTOP Summary is designed to facilitate communications and coordination among concerned technical personnel in Government, industry, and universities. The publication briefly describes NASA's research and development objectives, identifies the installation of primary interest, and provides a point of contact for technical information. The summary should be especially helpful to small research firms in ascertaining NASA technical requirements. It is available from the Center for Aerospace Information, P.O. Box 8757, Baltimore, MD 21240.

Information on NASA's use of information resources is published annually in the NASA Information Resources Management Long-Range Plan. This document provides a five-year outlook at the scope of the information resources to be acquired to support NASA's established programmatic and institutional needs, and it provides references to other NASA reports important to these initiatives. It is available at the same locations as identified above.

Another valuable source of information on NASA technical programs is the NASA Long-Range Program Plan, also published annually. This comprehensive document presents NASA's planned program of aeronautics and space research and development for five years into the future. It is available for review in the libraries and Small Business Offices at all NASA installations, and will be provided to qualified companies with a demonstrated need upon written request to NASA Headquarters, Small Business Office, Washington, DC 20546.

The NASA RTOP Summary and Long-Range Program Plan are valuable sources of information on NASA's Research and Development activities.

Ames Research Center

Moffett Field, California

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NASA
Canada

A full-scale model of a supersonic short take-off/vertical landing fighter, designated the E-7, in the NASA-Ames 40 x 80 wind tunnel, is pictured above.

Building on a series of major accomplishments which extend from 1941, the Ames Research Center is continuing to pursue national goals in aeronautics and space. Among the NASA centers it is noted for its technical excellence in life sciences and advanced life support, human factors and automation sciences, computational and experimental fluid dynamics, flight dynamics, stability and control, flight research, space and planetary sciences, astronomy, earth and atmospheric sciences, high-temperature materials and heat transfer, and technical project management. Its facilities of superior merit include wind tunnels, manned-flight simulators, research aircraft high-enthalpy arc jets, a life sciences laboratory complex, airborne scientific laboratories, and advanced large-scale scientific computational facilities.

As the NASA Center with primary responsibility for research in the life sciences, Ames' life sciences program covers many disciplines and research areas. Biomedical research includes developing and operating hardware and experiments for determining the effects of space flight on nonhuman living organisms, and for providing information to solve space medicine problems. Advanced life support system research is conducted to develop techniques for sustaining human life and maintaining human efficiency in space. Extraterrestrial life detection studies are concerned with the origin of life and with the abundance and distribution of life and life-related compounds in space and on the other planets.

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Advanced space suit technology development

Analysis and Research

Ames researchers utilize a multitude of approaches in the study and advancement of aeronautics. Theoretical analyses and research are performed first in computer simulation and fluid mechanics, and are then verified in wind tunnels such as the world's largest wind tunnel, the 40 x 80 x 120 National Full Scale Aerodynamics Complex or the 200,000 hp Mach 0.5 to 3.5 Unitary Plan Wind Tunnel.

Flight concepts and characteristics of proposed aircraft are checked in actual flight with research aircraft, which can simulate the flight of a range of types of aircraft. Research pilots perform flight maneuvers on the ground in flight-motion simulators, which duplicate performance of planned new aircraft. Analytical and experimental work on guidance and control is done by other researchers.

Aeronautical Human Factors

Aeronautical human factors study the relationship of the human to the aviation system to develop advanced cockpit controls and displays, more realistic flight simulators, and to identify and resolve human factors problems affecting air safety.

Currently, the areas of greatest interest in aeronautics are the development of vertical or short take-off and landing (V/STOL) aircraft and rotorcraft for urban regional transportation systems and for military aircraft applications, and the development of the capability to calculate aerothermodynamic flow about aircraft.

Astronautics

Ames' work in astronautics encompasses research in space sciences, earth science applications, and spacecraft development. Associated technology development in support of astronautics programs is concentrated on infrared sensors, cryogenics, atmosphere entry aerothermodynamics and thermal protection systems, and on computational chemistry.

Space Sciences

Space sciences research includes astrophysics, astronomy, studies of planetary atmospheres, and climate and stratosphere research. Data for these studies are provided by aircraft, sounding rockets, balloons, and spacecraft.

Earth science applications is a program of research and development for the effective use of remote sensing technology for Earth-science-related sources applications. The use of this technology is tested in a variety of users' settings – both regional and institutional. Emphasis is placed on improving the techniques for extracting useful information from remotely sensed data.

Spacecraft Development

Spacecraft development includes the conception, development, and operation of infrared telescopes and planetary atmosphere probes.

Flight Operations–
Hugh L. Dryden Flight Research Facility

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Located in California's Mojave Desert, Dryden supports the landing, servicing, and ferry preparation of the Space Shuttle utilizing a specially equipped 747 pictured above.

Activities at NASA's Ames-Dryden Flight Research Facility, located on Edwards Air Force Base, are centered on high-performance aircraft flight research. Ames-Dryden is NASA's prime aeronautical test arm. The facility is located at Edwards for access to a large dry lakebed, which provides plenty of room to land experimental vehicles. Edwards also offers clear air, good weather, a low population density, and a high-speed flight corridor.

Ames-Dryden is host to most Space Shuttle landings and has extensive ground facilities to prepare orbiters for their return trip to NASA's Florida launch site atop the 747 Shuttle Carrier Aircraft.

Ames-Dryden researchers conduct experiments in flight control systems, propulsion systems, structures, handling qualities, systems integration, flutter and aeroelasticity, and aerodynamics.

Facilities

Facilities available to scientists and engineers today to explore the high-speed flight region and its effects include state-of-art computers and simulation capabilities.

The Thermal Structures Research Facility

The Thermal Structures Research Facility is in operation for structures experiments and is capable of heating a full-scale aircraft to 2500°F for loads and heating tests.

The Western Aeronautical Test Range

The Western Aeronautical Test Range supplies complete test mission support, such as control rooms, telemetry, radar, real-time processing displays and controls, command uplinks and data downlinks, post-mission data reduction, video, and a mobile capability that can support a test mission anywhere in the United States.

Experimenters have data available from computational fluid dynamics, wind tunnels, water tunnels, simulation computers and predictions, and are able to correlate this data with the final proof–actual flight test.

The Integrated Test Facility

The Integrated Test Facility (ITF), currently scheduled to open in late 1991, will support testing of advanced aircraft and their complex, interdependent systems in a centralized location, as the ITF will accommodate up to six airplanes. Ground computers will test the aircraft's systems independently and together, giving the closest simulation to flight possible, including use of the actual airplane.

Researchers are currently investigating high angle of attack flight using an F/A-18 aircraft. Research in this area is limited and NASA envisions particularly useful information coming from this program.

Aeronautical flight research continues on the experimental X-29. This aircraft features sharply angled forward swept wings and makes extensive use of composite materials. The second X-29 is used for a high angle of attack flight program.

The B-52 used to launch the X-15 and lifting bodies is being used in a developmental program to air-launch a three-stage booster called Pegasus that places a satellite in orbit.

The Ames-Dryden Highly Integrated Digital Electronic Control Program, flown on the facility's F-15 aircraft, enables the flight control and propulsion systems to communicate with each other, thus providing improved performance.

Ames-Dryden also will be playing a major role in the testing of the X-30, the research vehicle that is part of the National Aerospace Plane (NASP) program.

The Small Business Specialist at Ames Research Center is available to help firms in identifying potential procurement opportunities at both Ames and Ames-Dryden, and encourages inquiries from interested companies.

Goddard Space Flight Center

Greenbelt, Maryland

An artist's concept of the first polar-orbiting platform of the Earth Observing System (EOS) is pictured above.

The Goddard Space Flight Center (GSFC) was established as a major eastern field center in 1959. A modern, campus-like complex of 36 buildings, the Center is situated ten miles northeast of the nation's capital on about 1,100 acres in Greenbelt, Maryland. Goddard also includes approximately 6,200 acres of buildings, rocket and balloon launch facilities and 940 employees at the Wallops Flight Facility in Wallops Island, Virginia. Staffed by more than 3,700 Government employees and some 8,100 contractor personnel, the Goddard team is made up of some of the world's leading groups of scientists, engineers, technicians, and administrative managers devoted to research in space science and applications, astronomy and space physics, and space tracking and communications.

Goddard's fundamental mission is to make possible the expansion of human knowledge of the Earth, its environment, the solar system and the universe through the development and use of near-Earth orbiting spacecraft. Goddard is one of the few installations in the world capable of conducting a full range space-science experimentation program from theory through experimentation, design and construction, satellite fabrication and testing, tracking, data acquisition and reduction.

Goddard is responsible for supporting NASA's leadership role in space and Earth sciences; research and application of technology for sensors, instruments, and information systems; planning and executing space-flight projects for scientific research; and for tracking of manned and unmanned Earth satellites through a worldwide communications network.

Goddard's scientific staff is concerned primarily with research into magnetic fields, energetic particles, ionospheres and radio physics, planetary atmospheres, meteorology, interplanetary matter, solar physics, communications and astronomy.

The satellite and sounding rocket programs at Goddard advance our knowledge of the Earth's environment, Sun/Earth relationship, stars, galaxies, and the physical makeup of the universe. Applications spacecraft projects are advancing technology in such areas as communications, meteorology, navigation, pollution monitoring, and the detection and monitoring of the Earth's limited natural resources.

Flight Telerobotic Servicer

Goddard is responsible for developing a Flight Telerobotic Servicer (FTS) to demonstrate the use of telerobotics in space for satellite servicing, assembly, and applications with Space Station Freedom.

Earth Observing System

As a result of its diversity of resources— scientists, research, and communications—Goddard plays a major role as the lead NASA center for the Earth Observing System (EOS), a multimission program of the 1990's to study global changes taking place and planet Earth's environment. Goddard will be the location of the EOS Data and Information System (EOSDIS), which will command and control the Earth Observing System platforms and instruments, and process, archive, and distribute data from them.

Tracking and Data Relay Satellite

A constellation of three satellites forming a new generation in satellite tracking systems was completed when Goddard's Tracking and Data Relay Satellite (TDRS-4) was launched from Kennedy Space Center on March 13, 1989. From their geosynchronous orbit 35,892 kilometers above the Earth, the system of satellites will track satellites and the Shuttle in lower orbits, providing nearly continuous coverage, and virtually eliminating the need for ground-based tracking stations. In addition, each of the satellites can transmit the equivalent of 300, 14-volume sets of encyclopedias per second.

Delta Launch Vehicle

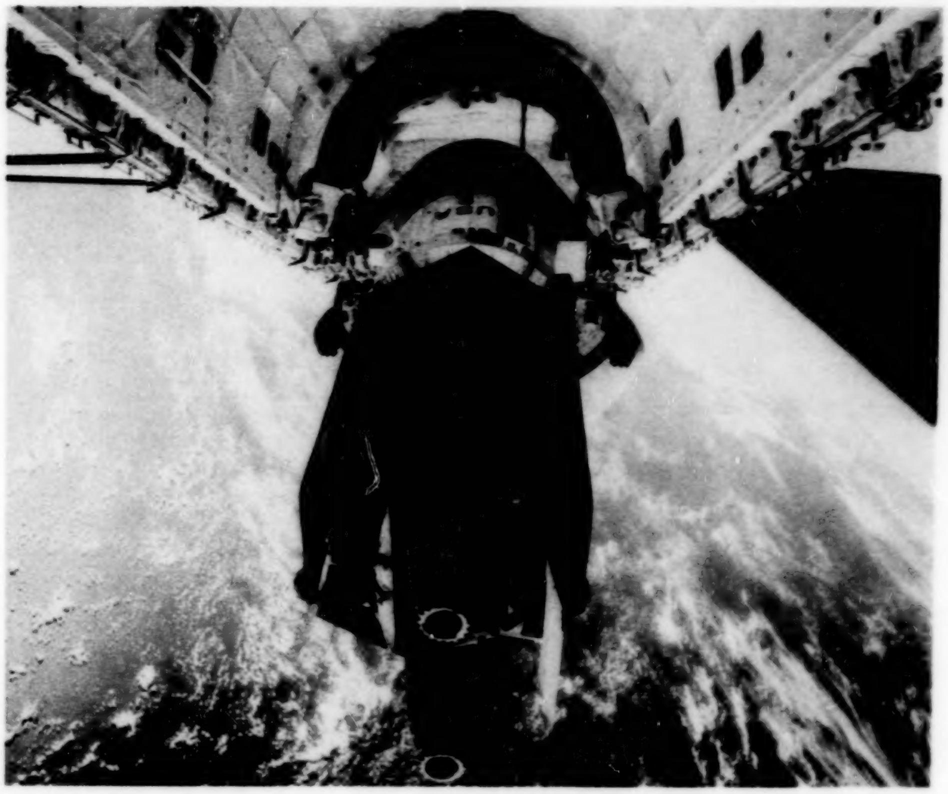
A major mission at Goddard is project management of the reliable Delta launch vehicle, which has placed into orbit more than 170 successful unmanned satellites for NASA, other Federal agencies, domestic communications corporations, and numerous foreign countries.

Satellite Systems

Goddard manages the polar-orbiting TIROS satellite system, which provides environmental data and carries search and rescue equipment, and the Geostationary Operational Environmental Satellite (GOES), which NASA manages through launch for the National Oceanic and Atmospheric Administration (NOAA) under the jurisdiction of the Metsat Projects Office. Goddard's Metsat Projects Office also manages Goddard's role in NASA's Search and Rescue Program.

Hubble Space Telescope

The Goddard-managed Hubble Space Telescope (HST) will permit astronomers to explore areas of the universe never before seen by man, enabling them to study stars many times fainter than the dimmest celestial objects yet detected. Goddard is responsible for the development of five of the Hubble Space Telescope's six instruments; the development of the instrument command and data handling system; the development of the operations ground system; and the conduct of telescope operations. Once in orbit, the telescope will be operated from Goddard through its Space Telescope Operations Control Center (STOCC). Goddard also manages the Space Telescope Science Institute (STScI), a user facility where the scientific observing program is formulated on behalf of the astronomical community.



The Tracking and Data Relay Satellite (TDRS-C) and its inertial upper stage are deployed from the Space Shuttle Discovery's cargo bay during the STS-26 mission.

Cosmic Background Explorer

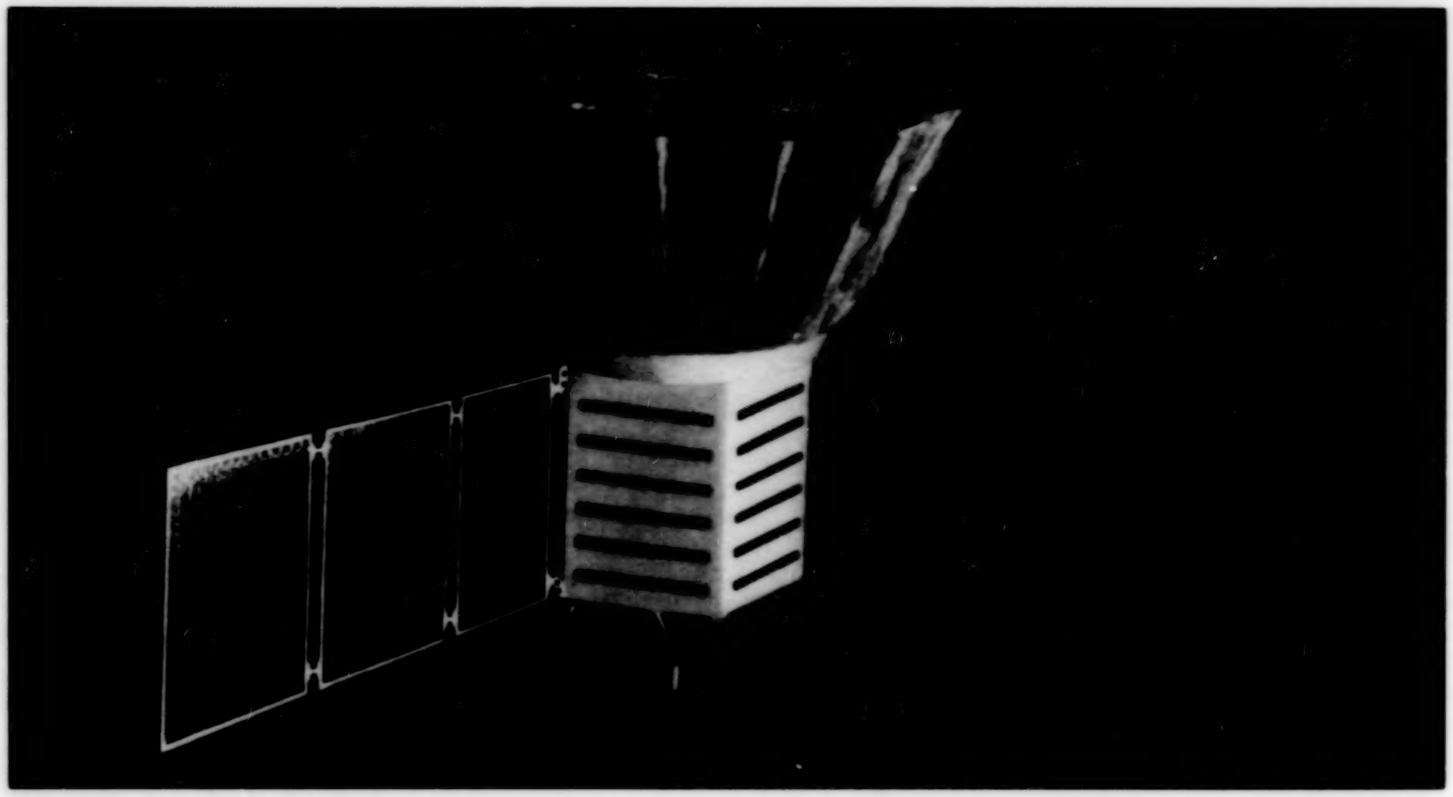
Another astronomical satellite, the Cosmic Background Explorer (COBE), will study the "Big Bang," the primeval explosion that started the expansion of the universe 15 billion years ago, and will search for remnant radiation from primeval galaxies. A major in-house project, the instruments and spacecraft were designed, built and tested by Goddard engineers, scientists and technicians. Originally scheduled for launch on the Space Shuttle, the COBE was redesigned by Goddard engineers for launch aboard a Delta expendable launch vehicle.

The International Solar-Terrestrial Physics

The International Solar-Terrestrial Physics project (ISTP) is a combined effort involving the European Space Agency (ESA), Japan's Institute of Space and Astronautical Science (ISAS) and NASA in a series of five space-flight missions to study the interactions in the Sun-Earth system.

The Broad Band X-Ray Telescope

The Broad Band X-Ray Telescope (BBXRT) is an instrument designed by Goddard as part of the Shuttle High Energy Astrophysics Laboratory (SHEAL 2), an attached Shuttle payload mission comprised of several x-ray high energy astrophysics instruments and supporting flight systems. The Broad Band X-Ray Telescope will produce the first moderate-



Originally scheduled for launch aboard the Shuttle, the Cosmic Background Explorer (COBE) was completely redesigned for launch by a Delta expendable launch vehicle.

resolution x-ray spectra of a large variety of cosmic x-ray sources; two explorer missions, the X-Ray Timing Explorer (XTE) and the Extreme Ultraviolet Explorer (EUVE), which will make the first use of a reusable Explorer platform with interchangeable payloads to be replaced on-orbit; the Gamma Ray Observatory (GRO), a spacecraft which has greater capabilities for observing than any previous gamma ray mission; and the Upper Atmosphere Research Satellite (UARS), a spacecraft devoted to providing integrated global measurements of the chemistry, dynamics, and energetics of the upper atmosphere.

Some of Goddard's theoretical research is conducted at the Goddard Institute for Space Studies (GISS) in New York City. Operated in close association with the academic community, the Institute provides supporting research in geophysics, astrophysics, astronomy and meteorology to NASA and Goddard. Dr. James Hansen, Director of the GISS is well-known for his work on global warming, or the greenhouse effect.

Goddard is also the home of the National Space Science Data Center. This facility is the central repository for the scientific data collected from space-science experiments.

In October 1981, Goddard was consolidated with the Wallops Flight Facility. The facilities at Wallops are used by scientists and engineers from laboratories and Research Centers of NASA and other Government agencies, colleges and universities, and the scientific community worldwide.

Goddard's Wallops, Virginia, launch range provides vehicle assembly and launch facilities, communications, tracking instrumentation, data acquisition and data processing of sounding rockets, reentry vehicles, and balloons and satellites launched from Wallops Island and other off-site locations. To date, more than 14,000 rocket-propelled space flight experiments have been successfully conducted from Wallops.

To maintain its active support of small and disadvantaged businesses, Goddard maintains an automated source system comprised of approximately 4,000 firms. The Center encourages businesses to submit a Solicitation Mailing List Application (SF129) to be added to the Goddard Automated Source System, and to contact its Small Business Specialist for advice on procurement opportunities.

Lyndon B. Johnson Space Center

Houston, Texas

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Much of the 1625 acre Johnson Space Center is visible in this aerial scene (a Saturn V display can be seen at left center).

The Lyndon B. Johnson Space Center (JSC) is a focal point of the nation's manned space-flight activities, including spacecraft development, program management, crew training, space-flight operations, and related medical research and life sciences. The Center is also responsible for conducting investigations of lunar science, space-science, and Earth resources technology and applications. The major programs assigned to Johnson Space Center include Mercury, Gemini, Apollo, Skylab, Apollo/Soyuz, Space Shuttle, Space Station Freedom and Space and Life Sciences. Additionally, Johnson Space Center is heavily involved in advanced planning of missions involving other planets and a possible return to the Moon.

In addition to its facilities at Houston, JSC also operates the White Sands Test Facility near Las Cruces, New Mexico, for testing propulsion and power systems, and special testing of materials, components and subsystems using hazardous propellants and other fluids.

All of Johnson Space Center's programs involve tremendous amounts of materials and services which must be obtained from outside the Government. Many opportunities exist for small business enterprises that want to participate in furnishing these requirements. Material needs range from raw materials and commercial items to sophisticated spacecraft, while services range from housekeeping to engineering, medical, and scientific capabilities. The Small Business Specialist at Johnson serves as a focal point to assist companies in understanding the Center's needs.

Continuing requirements exist in support of the following programs:

The Space Shuttle Orbiter

The Space Shuttle Orbiter is a reusable space airplane that carries satellites and scientific payloads into orbit. It can also serve as a service platform for repairing satellites in orbit or can be used to bring

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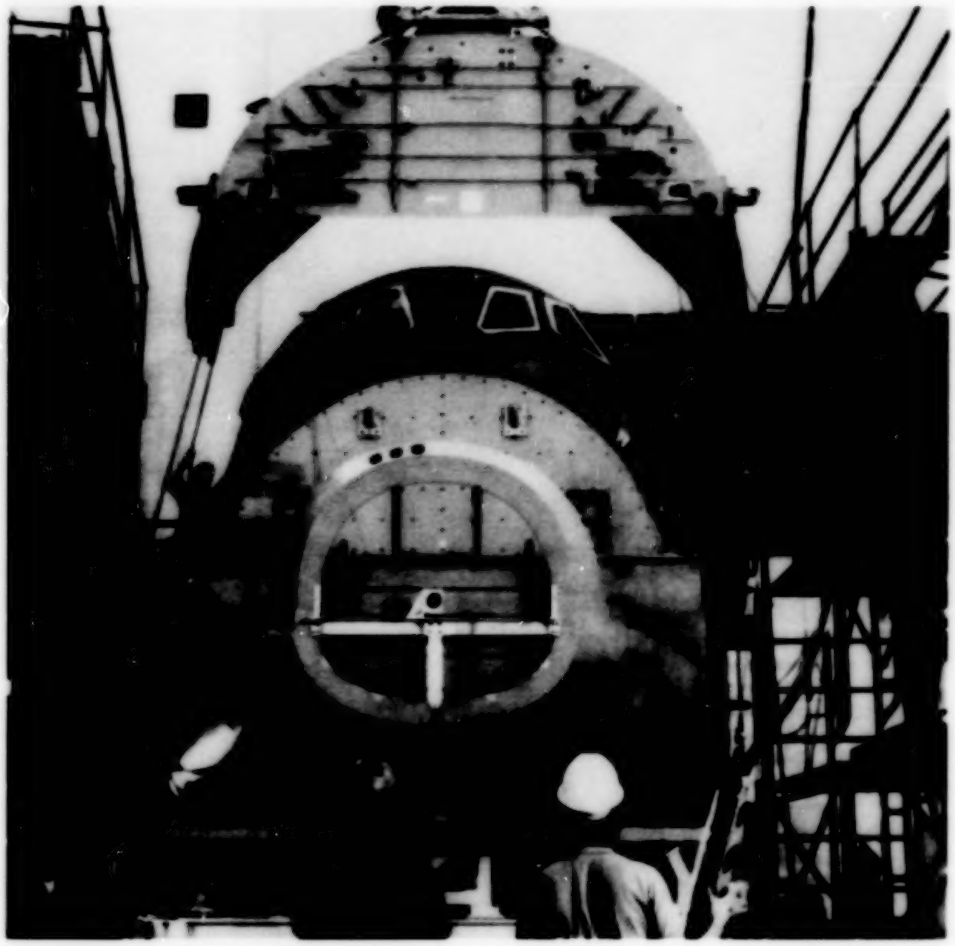
them back to Earth for repair. Johnson is the lead center for the Space Shuttle. The Space Shuttle is a standardized yet flexible system capable of accommodating a wide variety of payloads and types of missions. Other elements include payload supporting systems such as Spacelab, and upper stages. The spacelab is a joint venture between NASA and the European Space Agency to produce and operate in space a reusable laboratory that will be available to an international community of users in applied sciences, life sciences, and advanced technology. A schedule of user charges has been developed for the Space Shuttle which allows equitable payment for use and services by other agencies and nations as well as commercial enterprises.

Space Station

In 1984, NASA was directed by the President to build and operate a space station in the 1980's and 1990's. Johnson Space Center is responsible for the design of the Space Station Freedom's truss frame–or backbone–on which laboratory and living modules, antennae, power-generating systems, and cargo cranes will be attached. In addition, Johnson is responsible for airlocks, outfitting the interior of nodes that connect modules together, specific distributed systems, and mobile devices for servicing other space vehicles and satellites tended by the space station crews. Johnson Space Center will also develop major systems for the space station, including communication and tracking, data management, guidance and control, thermal control, and extravehicular activities systems. NASA's astronauts, trained at Johnson Space Center, will assemble space station segments delivered by the Space Shuttle in an extensive series of spacewalks. Later, crews will occupy the space station continuously to carry out research in life, Earth, and materials sciences.



Replacement orbiter (OV-105) undergoes fit check of lower and upper fuselages with crew module during its construction at the Downey, California facility.

The Space and Life Sciences Programs

The Space and Life Sciences Programs include life sciences, medical research, science experiment development, science payload management, lunar and planetary science, and space sciences. Johnson Space Center is NASA's leading Center for developing and managing life sciences experiments to be carried aboard the Space Shuttle and other future space-flight programs. The Center also manages the development and integration of experimental instrumentation and support equipment for use in space and life science programs; conducts biomedical research on the physiological stress of space flight on man; develops technology and instrumentation to maximize crew efficiency, reliability, comfort, and safety in space flight; and manages NASA's programs to assess the environmental impact of space systems and operations.

John F. Kennedy Space Center

Kennedy Space Center, Florida

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Technicians prepare the orbiter nose gear area for flight in the Orbiter Processing Facility at Kennedy Space Center.

The John F. Kennedy Space Center (KSC) is NASA's manned launch site. KSC's primary mission is to prepare and launch the Space Shuttle and payloads. That mission orients this Center's activities toward the operational aspects of the space program.

Supporting the Kennedy Space Center's primary mission are a number of technical and administrative activities including design and engineering, testing, assembly and check-out of launch vehicles and payloads, and associated purchasing and contracting. In addition to prime contracting opportunities, there are extensive subcontracting opportunities available in fulfilling the needs of the major prime contractors.

The Kennedy Space Center has a number of large mission support contractors that provide extensive services. The largest contracts offering the greatest subcontracting opportunities currently include one for broad responsibility for overall base operations, another for processing the Shuttle and preparing it for launch, and a third for processing payloads and preparing them for launch.

Those contracts, in addition to others, offer potential markets for diversified products and services. As a point of reference in identifying potential markets, consider that of the almost 19,000 personnel working at KSC, less than 3,000 are NASA employees. Most of the others are employed by the mission support contractors.

The majority of current contract opportunities offered directly by the KSC Procurement Office can be classified in three general areas: construction, communications equipment/services, and computer systems.

Construction and Architect-Engineering Services

Construction and architect-engineering services are continually needed because KSC requires extensive facilities for both generalized and specialized purposes. These facilities include general and special purpose buildings and structures, warehouses, offices, roads, bridges, and a railroad line. In addition to design and actual construction, periodic renovation and maintenance of these facilities are necessary.

Communications Systems

KSC's communications systems include everything from conventional telephone systems to broadcast quality video systems and state-of-the-art fiber optics equipment.

Computer Systems

The Kennedy Space Center's computer systems' requirements include hardware, software, and almost every type of peripheral manufactured.

To better serve the needs of small and small disadvantaged businesses, a Kennedy Space Center Small and Small Disadvantaged Business Council was formed in 1990. Participants in this Council are prime contractor and NASA managers. A number of initiatives are currently being pursued by the Council, including better methods of sharing information on potential sources, providing training and counseling sessions to small businesses, and setting up communication channels for small businesses to offer constructive suggestions on how Kennedy Space Center can increase its responsiveness to the unique needs of the small business community.

The Kennedy Space Center sponsors an annual "Briefing to Industry," usually in November. Attendance in the past has been approximately 500 industry representatives. During the briefing, Kennedy Space Center and the supporting large businesses identify upcoming programs and provide information on the acquisition opportunities expected to be available during the upcoming fiscal year. A notice is published in the *Commerce Business Daily* providing advance notification once a firm date is established. Reservations are available on a first-come, first-served basis.

The best way to remain informed about upcoming Kennedy Space Center acquisitions is either through the *Commerce Business Daily* or its recorded announcement. That announcement, which lists currently available contracting opportunities 24 hours per day, can be accessed by calling (407) 867-3707.

For more specific information on contracting opportunities with Kennedy Space Center and its support contractors, contact the KSC Industry Assistance Office.

Langley Research Center

Hampton, Virginia

The Langley Research Center (LaRC) has long been considered a world class center in aeronautical and space-related research and development. Langley has helped solve problems and develop new techniques in these areas and has earned a reputation for innovative, high quality work. From the beginning, researchers have been directly involved in the design of new facilities and the improvement of research equipment. Adapting previous methods to solve new problems continues today.

Major research fields include aeronautics and space technology, aerodynamics, materials, structures, flight controls, information systems, acoustics, aeroelasticity, atmospheric sciences, and nondestructive evaluation.

Approximately 60 percent of the work at Langley is in aeronautical research, which includes finding ways to improve aircraft that fly today and development of concepts and technology for aircraft of the future. Langley uses wind tunnels, computer modeling, and other facilities and techniques to conduct tests and research for aircraft. This research includes investigation of the full flight range, from low-speed general-aviation and transport aircraft through high-speed hypersonic vehicles.

The aeronautical research goals of the Center are to develop technologies to help aircraft fly faster and farther, to be safer, and to enable these aircraft to be more maneuverable, quieter, less expensive, and more energy efficient.

Researchers are studying improved flight control systems to aid aircraft in operating more efficiently in all kinds of weather and in crowded terminal airways. In cooperation with the Federal Aviation Administration, Langley is examining wind shear, the cause of nearly 40 percent of U.S. airline fatalities.

The National Aerospace Plane is challenging Langley researchers to expand the limits in hypersonic (Mach 5-25) engines, heat-resistant materials and supercomputers for engine and airframe design. Improvements in Supersonic (Mach 1-5) engine performance, fabrication of composite materials, and laminar flow airfoil technology are spawning a new era in long-distance air travel. Passengers in the next century will benefit from current research programs at Langley.

A cryogenic wind tunnel, called the National Transonic Facility, is an important physical resource at Langley. First operational in 1983, the facility is shared by NASA and the Department of Defense, and is available to other government agencies, industry and educational institutions.

Langley has a long tradition of supporting the Department of Defense. Almost every military aircraft that flies today has been tested in a Langley wind tunnel. Special–often unique–research facilities at Langley are used extensively by the Department of Defense to support the full range of military aviation, from helicopters to supersonic fighters.

Approximately 40 percent of the work at Langley supports our national space programs. Researchers conduct studies in atmospheric and Earth sciences, identify and develop technology for advanced Space Transportation Systems, conduct research in laser energy conversion techniques for space applications, and provide the focal point for conceptual design studies for large space systems technology and Space Station Freedom activities. Langley researchers also study composite materials, structures, thermal control systems, electronic systems, and robotics.

Space Shuttle

The Space Shuttle is the first manned vehicle designed to fly through the atmosphere of Earth into the near-vacuum of space. Langley researchers did extensive work on the Space Shuttle structure, aero-

The Earth Radiation Budget Satellite, which is a free-flying observatory that is a key of the NASA Climate program, includes the ERBE and Sage II experiments. Identical ERBE experiments fly on the NOAA 9 and 10 Satellites to provide global coverage.

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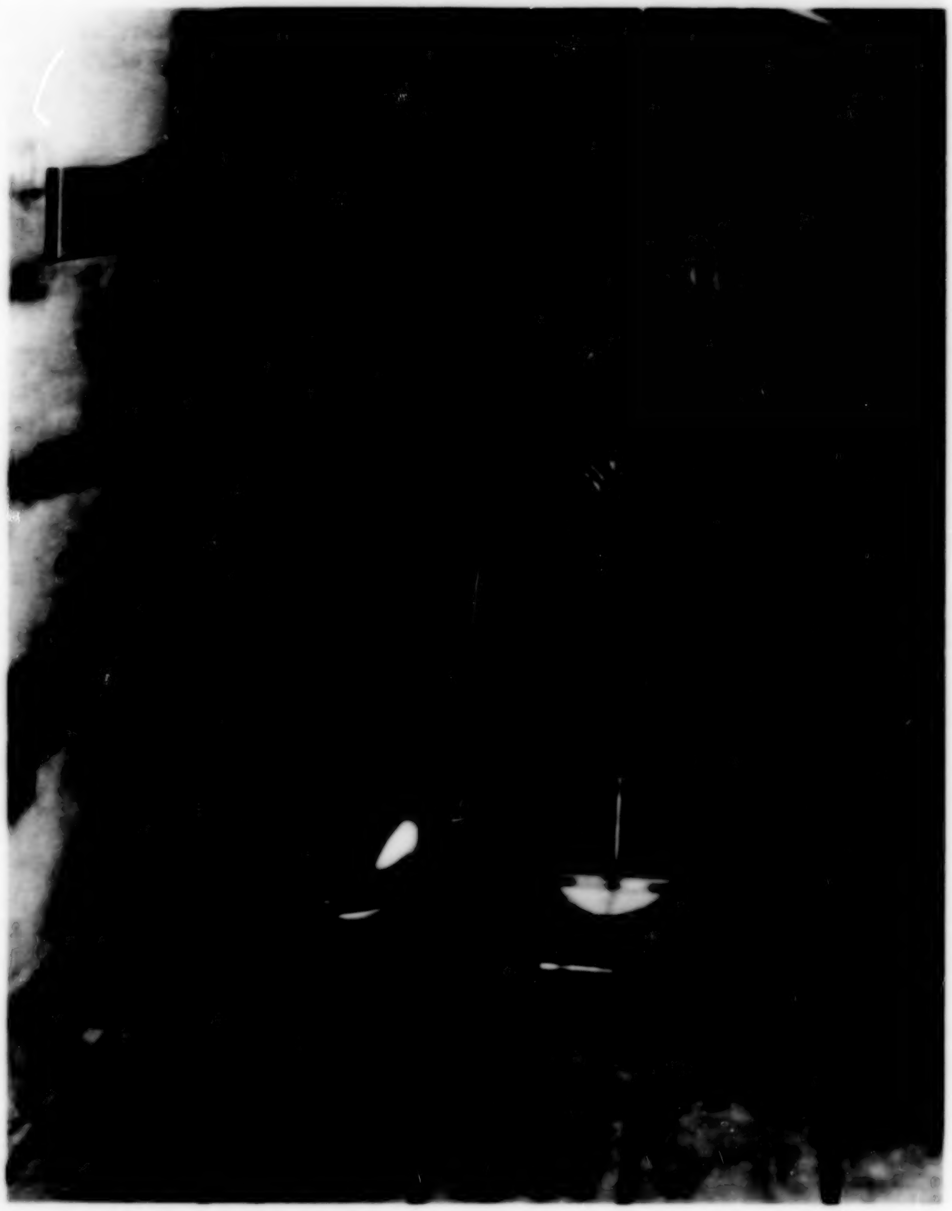


An advanced transport configuration with a high-aspect ratio super critical wing undergoes testing at Langley's National Transonic Facility.

dynamics, and thermal protection system and contributed significantly to the return-to-flight effort that launched Discovery on mission STS-26. Several Space Shuttle payloads have been developed at Langley, including the Long-Duration Exposure Facility, filled with 57 experiments and deployed in orbit for several years; ACCESS, an erectable structure that was assembled by astronauts in the Space Shuttle payload bay; and several sophisticated sensors that have investigated the Earth's atmosphere from orbit.

Space Station Freedom

Design Studies for Space Station Freedom are underway at Langley, including construction techniques, systems engineering and integration, and large space antenna development. The investigation focuses on packaging large space structures for delivery aboard the Space Shuttle; how to deploy, control and power them; and even how to manufacture them in space.

Atmospheric Sciences

Langley also manages a specialty area in atmospheric sciences in which researchers are involved in seeking a more detailed understanding of the origins, distributions, chemistry, and transport mechanisms that govern the Earth's atmosphere. These researchers conduct theoretical studies and collect global atmospheric data from aircraft, balloons, and land-and-space-based remote sensing instruments that are designed, developed, and fabricated at Langley. Studies of the global impact of natural and man-made atmospheric phenomena provide information that is used to learn the effects that natural and human activities have on atmospheric chemical and dynamic processes. Sensors are developed to collect atmospheric data on a global scale from the ground, aircraft, and space.

Two major satellite experiments are the Earth Radiation Budget Experiment (ERBE), which studies the balance of solar radiation in the Earth's atmosphere, and the Stratospheric Aerosol and Gas Experiment (SAGE), which measures ozone and aerosol concentrations in the upper level of the atmosphere.

The Global Tropospheric Experiment (GTE) is a multifaceted program to study the chemistry of the lowest levels of the atmosphere to improve the understanding of global changes.

Langley actively supports small and disadvantaged business participation in its procurement programs and encourages such companies to submit Solicitation Mailing List Applications, as well as meet with the Small Business Specialist for assistance and advice.

Lewis Research Center

Cleveland, Ohio

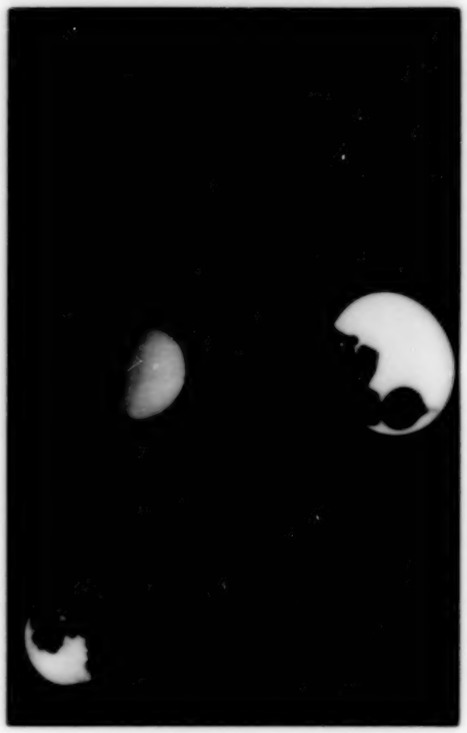
Activities at NASA's Lewis Research Center (LeRC) are directed at advancing technologies for aeropropulsion, space propulsion, space power and space science and applications.

Aeropropulsion activities at Lewis are aimed at the advancement of aeropropulsion technology with significant and growing strategic emphasis on the needs of high-speed propulsion systems. Included in these efforts are research on high temperature (3500°F) materials, special design analysis methods, high temperature sensors, integrated fiber-optic control systems, metal-matrix and ceramic-matrix composite structures for high thrust-to-weight turbine engine cores and >3000°F turbine components.

The Aeropropulsion Program

The aeropropulsion program involves five classes of aircraft, plus generic research applicable to several of the five aircraft classes. Efforts toward subsonic transports will be directed at technologies for an ultra-high-thermal-efficiency core engine to reduce the fuel usage of transport engines further. Research efforts directed toward rotorcraft and general aviation aircraft focus on development of ceramic turbomachinery components to achieve higher operating temperatures and better fuel efficiency.

In the area of supersonic transports, a major project for High Speed Civil Transports (HSCT) is being planned. Efforts in support of high-performance military aircraft include research on high thrust-to-weight propulsion systems for short take-off and vertical landing (STOVL) aircraft. A major effort in hypersonic aircraft involves support for the joint NASA/Department of Defense National Aerospace Plane (NASP) Project. In addition to these efforts, Lewis will continue to conduct research into minimizing the effects of icing conditions on all aircraft, increasing operating temperature capabilities, extending life and reliability, and decreasing cost of engines.



The Advanced Communications Technology Satellite (ACTS) is the main focus of NASA's communications research and development program. It is now under development and scheduled for launch in 1992.

Space Propulsion

The space propulsion effort at Lewis includes high power (megawatts) electric propulsion, the Space Transfer Engine and advanced concepts and technology, with major emphasis on research for advanced Space Shuttle main engines and liquid oxygen-hydro-carbon engines for heavy-lift applications.

Lewis is firmly committed to space power efforts with its major emphasis on the development and operation of the Space Station electric power system; the SP-100 project, which involves a joint NASA/Department of Defense/Department of Energy effort to develop the technology base for a versatile space nuclear reactor, with Lewis's emphasis on the development of the highly efficient free-piston Stirling engine; and the Moon/Mars exploration, which focuses on power systems for early lunar or Mars outposts.

The Space Station focus is on the development and operation of an electric power system. This involves 75kW of large-area silicon cell photovoltaic arrays, nickel-hydrogen battery storage, the 20-kHz end-to-end power management and distribution system, and a solar dynamic power conversion system.

Activities in space science and applications efforts include microgravity science and in-space technology experiments, including areas such as combustion, fluid physics, materials and cryogenic fluid handling; Advanced Communications Technology Satellite (ACTS) development and flight; and development of future Centaur-derived upper stages, as well as management of other NASA unmanned launch services.

Lewis provides many laboratories for physical, chemical, metallurgical, and electronics research. Test cells for engine and component studies are provided with air and exhaust from central supplies. In addition, the Center maintains a number of large, specialized facilities for simulating the environments in which engines or spacecraft may be expected to operate: altitude chambers for full-scale jet engines; a facility for high-pressure and high-temperature tests of turbines; large supersonic wind tunnels; thrust stands for chemical rockets; 128-meter vertical tank for zero-gravity (free-fall) tests; and large high-vacuum chambers with cryogenically-cooled walls for simulating the space environment.

The diverse nature of the research activities at Lewis offers many and varied procurement opportunities for small and disadvantaged firms. These companies are encouraged to seek the assistance of Lewis's Small Business Specialist.

Marshall Space Flight Center

Huntsville, Alabama

The Marshall Space Flight Center (MSFC) is a development and multiproject Center with primary emphasis on the development and application of space transportation and propulsion systems; manned space systems; large space observatories, payloads, and experiments; space exploration systems; and the conduct of research, technology, and advanced development. Principal Marshall roles include the design and development of rocket propulsion systems; manned vehicle systems; large, complex, and specialized automated spacecraft; Spacelab mission management and payload definition; and management of space processing activities.

Marshall also has a primary role in the development and processing of science and applications experiments. In addition, Marshall conducts a vigorous research and technology program and is involved in the study and definition of future programs, including the development of complex space structures, space propulsion systems, materials engineering, materials processing in space experiments, satellite power systems definition, fundamental electronics, and payload system analysis and integration.

Space Transportation and Propulsion Systems

Space Shuttle

Marshall developed and continues to provide the orbiter's engines, the expendable external tank that carries liquid hydrogen and liquid oxygen for those engines, and the solid rocket boosters that assist in lifting the orbiter off the launch pad. In addition, Marshall is responsible for the development of an Advanced Solid Rocket Motor, planned as the replacement for the current Shuttle motor in the mid-1990's. The advanced motor project provides an opportunity for improved quality and safety through automation and advanced manufacturing methods and potential improvement in performance.

Upper Stages

Marshall manages two space transfer vehicle systems. These are the Inertial Upper Stage (IUS) and the Transfer Orbit Stage (TOS) vehicles. The IUS, a two-stage rocket, places spacecraft in high-Earth orbits or on escape trajectories for planetary missions. In the most recent application, in October 1990, an IUS helped send the Ulysses spacecraft on its way toward a polar orbit of the Sun. The single-stage TOS is intended to boost satellites such as the Advanced Communications Technology Satellite (ACTS) into geosynchronous transfer orbit and is scheduled to launch the Mars observer spacecraft into interplanetary orbit.

Launch Vehicles

In other areas of study, Marshall has lead responsibility for NASA's New Launch Vehicle program. Marshall is working with the industry and the Department of Defense to develop an unmanned cargo-carrying launch vehicle. This vehicle could utilize some elements of the manned Space Transportation System in existing or modified form, and a new liquid oxygen/liquid hydrogen rocket engine: the Space Transportation Main Engine. This combination could triple the lift capability of the current manned system to low-Earth orbit and would provide NASA with an unmanned vehicle for use when an on-orbit crew is not required to deliver or operate a payload. The in-line design is intended to be evolutionary. The first launch vehicles will be entirely expendable. Future upgrades could include a recoverable propulsion and avionics section.

Manned Space Systems

Spacelab

Marshall has program responsibility for Spacelab, a major international cooperative program between NASA and the European Space Agency, which has been developed as a key element of the Space Transportation System. Spacelab is designed as a versatile modular laboratory to be carried in the Shuttle Orbiter bay, and is a stepping-stone to Space Station Freedom. It provides researchers with modules in which they can conduct research, and unpressurized pallets which hold instruments requiring direct exposure to space.

Payloads and Missions

Marshall has mission management responsibility for many of the Spacelab missions and for other important scientific missions flown aboard the Space Shuttle. Marshall's mission management responsibility includes providing the focal point for planning, integrating, training, and operating. The Center is also responsible for defining and developing some instruments and equipment, and for maintaining the interface between the user community and the Space Transportation System.

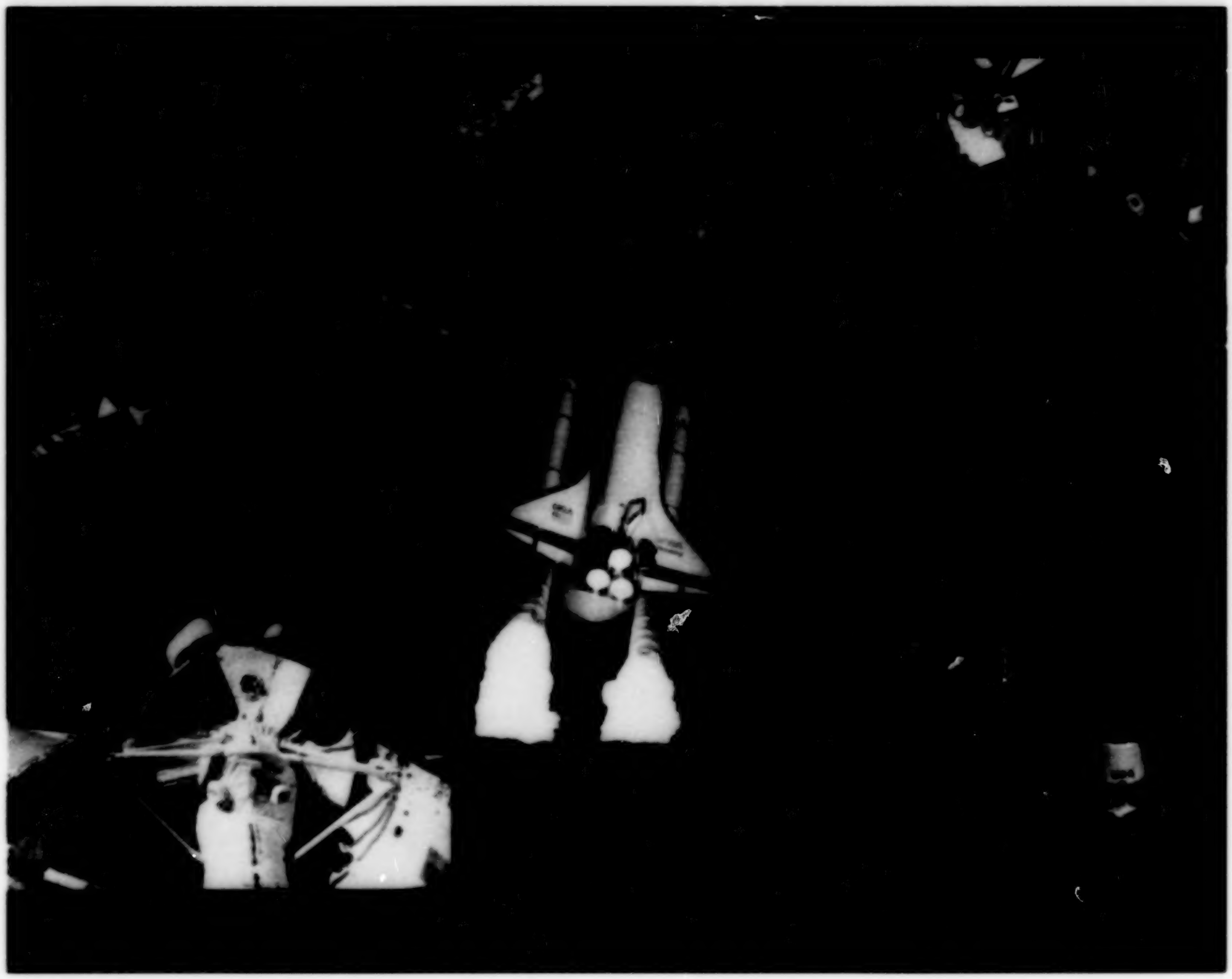
Space Station Freedom

In the development of Space Station Freedom, Marshall has responsibility for designing the habitation and laboratory modules, where crew members will live and work. Marshall is also responsible for the logistics elements; fabrication of the primary structure for the resources nodes, which provide interconnection between the modules; development of the environmental control and life support system; internal components of the audio/video and thermal control systems; as well as for operational capability development for users in the laboratory module.

Large Space Observatories, Payloads, and Experiments

Hubble Space Telescope

The Hubble Space Telescope, the development of which was a Marshall responsibility, is an optical telescope that has been placed in orbit above the Earth's hazy, turbulent atmosphere. Over its 15-year operational lifetime, it will enable



The photograph above shows the current projects being developed at MSFC.

scientists to see deeper into space and with more clarity than ever before possible. The Space Shuttle, which placed the telescope in orbit in April 1990, will serve in the future as a base from which astronauts can make repairs and replace instrument packages or add new experiments to the telescope. The telescope is the first of NASA's four "Great Observatories."

Advanced X-ray Astrophysics Facility

Another "Great Observatories" program being managed at Marshall is the Advanced X-ray Astrophysics Facility. Marshall has the complete management role assignment, covering the development, mission operations, science operations, and servicing over a 15-year period. This orbiting facility is to be launched in 1998. It will study x-ray emissions from some of the most violent events in the universe—neutron stars, pulsars, quasars, and black holes—which can penetrate the clouds of dust and interstellar debris, otherwise shrouding many galactic and intergalactic mysteries.

Tethered Satellite System

The Tethered Satellite System, a "satellite on a string," is also under Marshall management, and is slated to fly in June 1992. Designed to be carried into orbit by the Space Shuttle, the satellite can be suspended either downward or upward from the Shuttle's cargo bay on a tether—a super-strong synthetic cord about four centimeters thick and up to 97 kilometers long. When deployed upward, as it will be for its maiden mission, the satellite will study electrodynamic and other scientific phenomena. Deployed downward, as it may be in later missions, the satellite will troll the Earth's upper atmosphere for magnetospheric, atmospheric, and gravitational data.

Aeroassist Flight Experiment

The Aeroassist Flight Experiment will gather data for improving spacecraft heatshields and demonstrating the theory of using the Earth's atmosphere for aerodynamic breaking. To accomplish this objective, the project is designing and building a spacecraft to be deployed and retrieved by the Space Shuttle during a mission in 1996.

Flight Experiments

Marshall is active in the development of flight experiments for the Space Shuttle and other vehicles and currently has more than 20 experiments approved for flight. Examples include the study of gamma ray bursts and transients; evaluation of the potential for tracking and prediction of severe storms by satellite; materials processing; and experiments to determine the effects of long-duration exposure of materials and equipment to a space environment.

Materials Processing in Space

Marshall is responsible within NASA for exploring and developing the potential for materials processing in space. The space environment offers a freedom from the influence of gravity that cannot be achieved on Earth for more than a few seconds. Growth of superior single crystals for solid state electronics, pure metals and alloys, high-strength composite materials, and separation of living cells for pharmaceutical products all show great promise.

Space Exploration

Marshall is playing a major role in the defining of an integrated transportation system for the Space Exploration Initiative which will involve manned and unmanned vehicles for Earth-to-orbit launch, transfer to the planets, and landing/ascent. In addition, the Center is supporting the definition of large surface scientific observatories and surface habitats for Moon and Mars bases.

Research, Technology, and Advanced Development

Marshall continues to conduct research, develop technology, and apply advanced development in many areas of interest throughout the Center. With the renewed interest in returning to the Moon and exploring Mars, Marshall is actively pursuing technologies needed to accomplish these objectives as part of the Exploration Technology Program. Areas of interest include advanced propulsion, aerobraking, cryogenic fluid management, materials, and space science.

The Solid Propulsion Integrity Program (SPIP) enhanced the technical data base for the nation's solid rocket motor needs. Advances in the engineering base have been made in motor nozzles, propellant mechanical behavior bondline characteristics, internal flow testing, and test beds to evaluate materials performance and validate thermo-structural models.

The Productivity Enhancement Complex at Marshall emphasizes increased productivity through automated processing. Within the complex, investigations being carried out include development of advanced welding systems, cryogenic and ablative insulations, advanced solid and liquid motor technology, composite manufacturing, vacuum plasma spray coating and forming techniques, and flight hardware refurbishment technology, all of which utilize advanced computer programmed robotic systems. Marshall is striving for technological advances that are required to fulfill the Nation's space objectives and goals.

Overall, Marshall is a brpad-spectrum engineering, science, research, and development facility which offers NASA a wide range of talents. Marshall is currently engaged in more projects than at any other time in its history.

Marshall also operates three component installations—the Michoud Assembly Facility in New Orleans, the Slidell Computer Complex in Louisiana, and the Yellow Creek Production Facility at Iuka, Mississippi. Space Shuttle Main Engine and Main Propulsion Systems testing is performed at the John C. Stennis Space Center. Advanced Solid Rocket Motor full-scale testing, as well as developing and testing the propulsion system for the New Launch Vehicle program, will be conducted at the Stennis Space Center for Marshall.

The Space Shuttle Discovery (Mission STS-26) on September 29, 1988, incorporated hundreds of MSFC-derived improvements to its motors, boosters, main engines and external tank when it took America back to space.

John C. Stennis Space Center

Stennis Space Center, Mississippi

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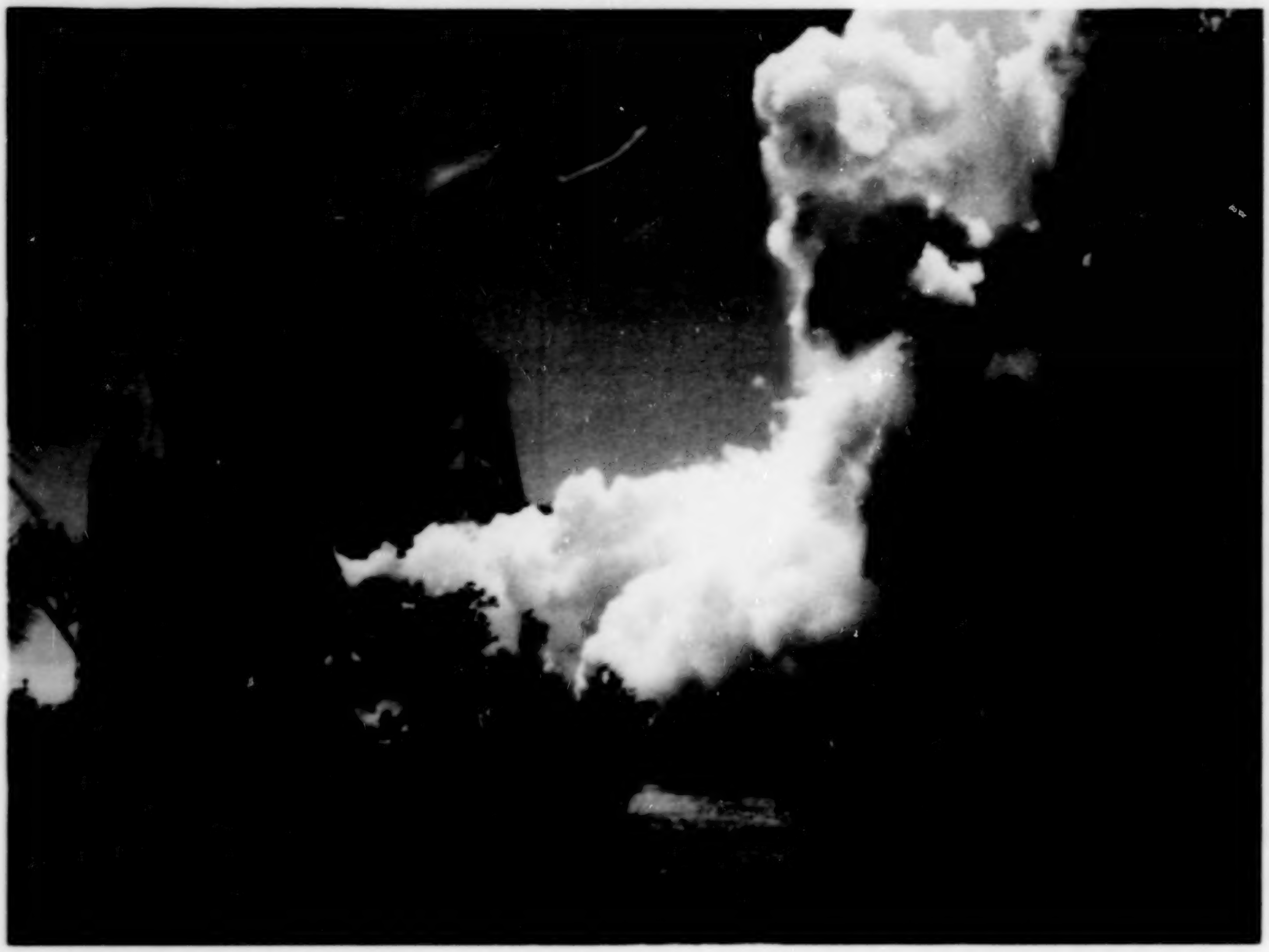

Static test firing of the Space Shuttle main engine at John C. Stennis Space Center is pictured above.

The John C. Stennis Space Center (SSC) is the prime NASA installation for static test firing of large rocket engines and propulsion systems. SSC is the second largest NASA Center, occupying 546 square kilometers and surrounded by a 5,074 square kilometer unpopulated Buffer Zone. The Center is located on the Mississippi Gulf Coast and is the site of several major science and technology programs. A significant advantage of the facility is the availability of all forms of transportation, including a direct water transportation route to the Gulf of Mexico and through the Intracoastal Waterway to Kennedy Space Center.

Stennis Space Center evolved from the former Mississippi Test Facility (MTF), which was constructed, activated, and operated during the sixties for acceptance testing of booster stages of the Saturn V rocket system. NASA's redesignation of the Mississippi Test Facility as the National Space Technology laboratories in June 1974 recognized the expanded role the installation was playing in the nation's space and environmental efforts, in addition to its remaining the prime static test facility for large propellant rocket engine systems. The redesignation further recognized the increasing number of NASA and non-NASA programs being accomplished by resident elements at the facility.

In May 1988, the Center was rededicated to become the John C. Stennis Space Center, named for the Mississippi senator whose personal involvement has been crucial to the evolution of the installation into a center of excellence that has received both national and international recognition.

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Stennis Space Center's administrative complex is shown in this aerial photograph. The 90-foot observation tower distinguishes the Visitors Center.

Space Shuttle Main Engine

At present, Stennis Space Center has as its main mission the support of development testing of the Space Shuttle main engine and of large propulsion systems. All main engines used to power the Space Shuttle are proven acceptable for flight at Stennis before an actual mission. In support of the Space Shuttle, Stennis Space Center maintains dedicated facilities used for developmental testing, including a high pressure industrial water facility, emergency power capabilities, high pressure gas facilities (up to 6000 psi), propellant and cryogenic facilities, and support laboratories and shops.

Remote Sensing

Secondly, the Center's Science and Technology Laboratory conducts scientific and engineering research in land and oceanographic remote sensing, sensor and data systems, and life and environmental sciences, and applies these technologies to both Stennis Space Center propulsion testing, and needs in the private sector. Stennis plays the leading role for NASA in the commercialization of remote sensing technologies.

Services and Facilities

NASA's third mission at Stennis is to provide and manage a wide range of facilities and serves on a reimbursable basis to the 18 resident Federal and state agencies on site. The resident agencies include elements of the U.S. Navy, National Oceanic and Atmospheric Administration, Department of the Interior, Environmental Protection Agency, and others.

The future is bright for the Stennis Space Center. It has been designated as the testing site for the new Advanced Solid Rocket Motor soon to be developed. In addition, a new $70 million high pressure component test facility is being constructed to begin development of this country's next generation launch vehicle—the New Launch System (NLS).

Although the value of NASA procurement at Stennis Space Center is smaller than many of the other centers, unique opportunities may exist for firms with specialized technical expertise, as well as for companies with facilities management and support capabilities. The Small Business Specialist at Stennis may be contacted for additional guidance.

Jet Propulsion Laboratory

Pasadena, California

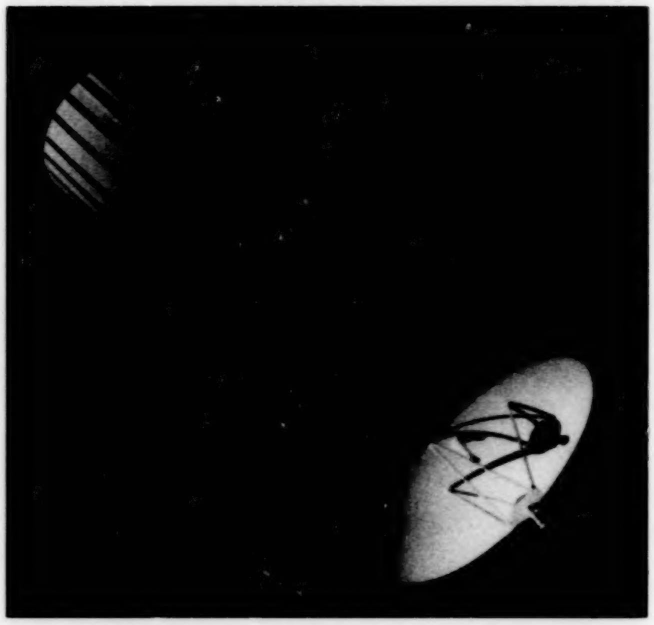
The Jet Propulsion Laboratory (JPL) of the California Institute of Technology is a Government-owned research, development and flight center that performs a variety of tasks for NASA. JPL works under contract to NASA Headquarters with day-to-day coordination provided by the NASA Resident Office.

The Jet Propulsion Laboratory's primary mission is the scientific exploration of the solar system through investigation of the planets, their satellites and deep space, using automated spacecraft. Also, the laboratory is responsible to NASA for supporting research and advanced development related to flight projects, as well as the management and operation of the Deep Space Network in support of those projects.

In addition, the Jet Propulsion Laboratory conducts selected projects to develop and apply new technologies to the solution of problems on Earth as well as in space, including research and development into energy sources, concurrent computers, neural networks using light for interconnections and advanced laser technology, among others. These projects are sponsored by other Government departments and agencies with the approval of NASA.

Voyager

The final planetary encounter of the Voyager mission occurred in August 1989 when Voyager 2 completed its "grand tour" of the outer planets with a successful flyby of Neptune and its icy satellite, Triton. Both Voyager 1 and 2 are expected to return data about the solar wind for at least another 20 years. The twin spacecraft are now on their way out of our solar system and are searching for the boundary that exists between our Sun's influence and the beginning of interstellar space.



The Magellan spacecraft, pictured above, is attached to an Inertial Upper State (IUS) rocket. JPL manages the Magellan program.

Magellan

The Magellan spacecraft was launched from the Space Shuttle in May 1989 and continues to map the surface of Venus with imaging radar. Galileo, launched from the Space Shuttle in October 1989, is in an interplanetary cruise phase toward Jupiter. It will arrive in 1995 and study the planet and its satellites for 2 years. Ulysses, a joint NASA and European Space Agency mission, is currently on its way to study the poles of the Sun.

Other Missions

Upcoming missions for JPL include Mars Observer and Topex/Poseidon, a mission to map the circulation of the ocean. Missions are also scheduled to go to Saturn and to fly by an asteroid and rendevouz with a comet, using spacecraft in the Mariner Mark II program.

Earth Observing Systems

The Jet Propulsion Laboratory will also play a role in the Earth Observing System (EOS) project, to include instrument-laden, polar-orbiting platforms in a multidisciplinary study of Earth's oceans, atmosphere and land.

Supporting research and advanced development are conducted in electric propulsion, nuclear power, chemical propulsion, aero-thermodynamics, fluid physics and electrophysics, applied mathematics, space power generation, optical and radio astronomy, planetary atmospheres, fields and particles, long-range communications, guidance and control, and systems simulation and analysis techniques. These programs make a substantial contribution to NASA programs in propulsion, tracking and data acquisition and planetary exploration.

Many of the technical advancements required for the success of lunar, planetary and space exploration also are applicable to problems of critical national interest. Under the direction of NASA, the Jet Propulsion Laboratory is expending considerable effort in the application of space-derived skills and capabilities to needs of the civil sector.

Because of the heavy emphasis on research and development, large quantity buys are seldom purchased at the Jet Propulsion Laboratory, with the exception of some electronic components. A significant portion of the total Jet Propulsion Laboratory procurement budget is spent on the following products and services: fabrication, electronic components, electronic instrumentation and test equipment, miscellaneous facility supplies and services, automatic data processing equipment, and construction.

Either the Small Business Specialist or Minority Business Specialist at JPL or the Small Business Specialist at the NASA Resident Office will assist companies in identifying procurement opportunities at the Jet Propulsion Laboratory.

CHAPTER 6

Several key Government agencies offer major assistance programs and other services to small businesses.

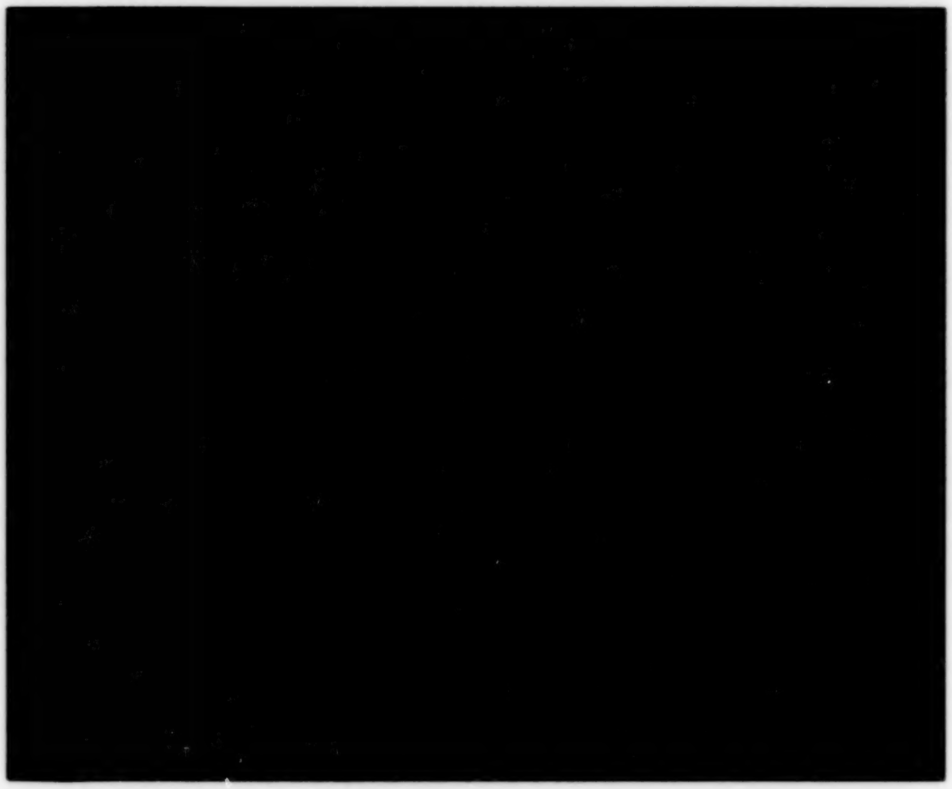
Although the Federal Government is extremely complex, there are several excellent sources of information and guidance which can be very useful to small and disadvantaged businesses. Some of the key government agencies and their services or publications are briefly described in this chapter.

SMALL BUSINESS ADMINISTRATION 1953

DEPARTMENT OF COMMERCE UNITED STATES OF AMERICA

GENERAL SERVICES ADMINISTRATION

Sources of Additional Help



There are many useful publications available to assist small firms in their efforts to do business with the Government.

All Government Agencies

Public Law 95-507 requires each Federal agency having procurement powers to establish an Office of Small and Disadvantaged Business Utilization to assist small and minority businesses. These offices are staffed with individuals dedicated to helping small companies do business with their agency, and are an excellent source of information and assistance. The name, address and phone number of the Small and Minority Business Specialist at each NASA installation is listed at the end of this Chapter.

Small Business Administration

The Small Business Administration (SBA) has numerous programs to help small businesses, ranging from free publications to technical assistance. SBA services are provided through local field offices at major cities throughout the country. These offices are listed under "U.S. Government" in the appropriate telephone directory. The NASA Small Business Specialist at any installation can direct companies to the nearest SBA office as well. All small businesses are encouraged to avail themselves of the many publications, services and programs provided by the SBA.

Two particularly useful publications produced by SBA are the "Small Business Subcontracting Directory," which lists major prime contractors with high potential for subcontracting, and the "U.S. Government Purchasing and Sales Directory," which is a guideline to Government agencies that buy particular goods and services. For more information on these publications, and other SBA services, contact the nearest SBA office.

Department of Commerce

As the main business agency of the Government, the Department of Commerce offers various types of assistance and guidance to small businesses. A special program called "Business Assistance Program," under cognizance of the Commerce Department's Office of Business Liaison, has been created to help companies find their way through the myriad of Federal agencies to seek answers to business-related questions in areas such as international trade, business licenses, franchising and others. More information may be obtained by writing to the Office of Business Liaison, U.S. Department of Commerce, Rm. 5898C, Washington, DC 20230.

The Minority Business Development Agency

The Minority Business Development Agency (MBDA) is an agency of the Department of Commerce specifically established to provide comprehensive assistance services to minority businesses. Minority Business Development Agency services are provided primarily through a nationwide network of MBDA Centers. Minority Business Development Agency regional offices in Atlanta, Chicago, Dallas, New York, San Francisco and Washington, DC, will provide the name and telephone number of the nearest Minority Business Development Center upon request.

The National Technical Information Service

The National Technical Information Service (NTIS) is sponsored by the Department of Commerce to provide access to millions of technical documents and reports resulting from Federal programs. The publications and services of the National Technical Information

Services are made available for a reasonable price that reflects the cost of providing them. For a free copy of the NTIS catalog, write the National Technical Information Service, Springfield, VA 22161.

General Services Administration

The General Services Administration (GSA) acts as the purchasing agency for numerous items of equipment and supplies, as well as services used by federal agencies. A small business can learn of items bought by GSA by writing to or visiting the nearest GSA Business Service Center. These offices are located in Atlanta, Boston, Chicago, Denver, Fort Worth, Kansas City, Los Angeles, New York, Philadelphia, San Francisco, Seattle, and Washington, D.C.

Federal Information Centers

The General Services Administration supports a network of Federal Information Centers, which are staffed to provide or locate sources of information on all Federal programs and services, and help to find answers to both business and consumer related questions. The Centers are listed as "Federal Information Center" under U.S. Government in the telephone directories of approximately seventy major cities, and a list of all the centers is available by writing to the Consumer Information Center, Pueblo, Colorado 81009.

Additional Publications

There is a wealth of material available to provide information to small and minority entrepreneurs, with much of it available through agency Offices of Small and Disadvantaged Business Utilization.

The Department of Defense (DoD) produces numerous valuable documents, including a directory of major prime contractors offering subcontracting opportunities.

- An extremely useful publication for small R&D companies, entitled "Small Business Guide to Federal R&D Funding Opportunities," is published by the National Science Foundation.

- "A Guide for Private Industry" tells how to obtain information regarding specifications and standards from the Department of Defense Single Stock Point for Specifications and Standards.

- The Department of Defense provides the "DoD Small and Disadvantaged Business Utilization Specialists (SADBUS)," which lists (on a nationwide basis) DoD SADBUS by name, location, and telephone number.

- The "Handbook for Small Business: A Survey of Small Business Programs of the Federal Government," compiled by the U.S. Senate Committee on Small Business, is another useful guide to Federal small business programs. It contains information on Government-sponsored loans and financial guarantees, management and technical assistance and programs, Government purchasing and sales programs, grants, and entering the world trade markets. It outlines design of Federal programs, describes each program, and indicates how and where further information may be obtained.

- SBA's "U.S. Government Purchasing and Sales Directory" provides an alphabetical listing of the products and services bought by the military departments and a separate listing for the civilian agencies. Also, the directory includes an explanation of the ways in which the SBA can help a business obtain Government prime contracts and subcontracts, data on Government sales of surplus property, and comprehensive descriptions of the scope of the increasingly important Government market for research and development.

- The Department of Commerce provides the "Directory of Federal & State Business Assistance; a Guide for New and Growing Companies." This directory lists many of the key individuals who can assist in helping a firm sell products and services to the Government, and it lists those agencywide procurement offices that have specific information about all of the procurement contacts in their agency.

- Cambridge Information Group (a private concern) has available for sale "The National Directory of State Agencies." This guide shows who controls what in every state and territorial government in the U.S. It lists names and telephone numbers of State-elected officials; State agencies arranged by function, such as Aeronautics, Real Estate, and Purchasing; names, addresses, and telephone numbers for associations of State Government officials; and an allstate telephone directory which alphabetically lists over 13,000 state officials, representatives, and staffers.

Sources for all publications mentioned above appear in Chapter 6.

All small and disadvantaged business owners are encouraged to visit the small business offices of agencies with interest in their products and services, to both seek assistance and review the large amount of written material that is available.

National Aeronautics and Space Administration

Small/Minority Business Personnel

NASA Headquarters
Washington, DC 20546

Office of Small and Disadvantaged Business Utilization - Code K

Director	Eugene D. Rosen	(202) 453 - 2088
Deputy Director	Franz W. Hoffman	(202) 453 - 2088
Minority Business Advisor	Rae C. Martel	(202) 453 - 2088
Small Business Advisor	Anthony T. Diamond	(202) 453 - 2088

Contracts and Grants Division - Code HWB

Small Business Specialist/Industry Assistance Officer	Richard Kall	(202) 453 - 1840

NASA Space Station - Mail Code HR

Small Business Specialist 10701 Parkridge Boulevard Parkridge III Reston, VA 22091	William Clements	(703) 487 - 7515

Field Installation Small Business/Minority Business Specialists

Ames Research Center Mail Stop 241-1 Moffett Field, CA 94035	Thomas J. Kolis	(415) 604 - 4690
Goddard Space Flight Center Mail Code 263 Greenbelt, MD 20771	Janet Jew	(301) 286 - 6574
Johnson Space Center Mail Code BD351 Houston, TX 77058	Robert L. Duppstadt	(713) 483 - 4134
Kennedy Space Center Mail Code SI-PRO Kennedy Space Center, FL 32899	Ann Watson	(407) 867 - 7217
Langley Research Center Mail Stop 144A Hampton, VA 23665	Vernon Vann	(804) 864 - 2456
Lewis Research Center Mail Code 500-313 Cleveland, OH 44135	Steve Fedor	(216) 433 - 2144
Marshall Space Flight Center Mail Code APO16 Huntsvile, AL 35812	Conrad Walker	(205) 544 - 0254
John C. Stennis Space Center Mail Code DAOO Stennis Space Center, MS 39529-6000	Rebecca Dubuisson	(601) 688 - 1636
NASA Resident Office, JPL Mail Code 180-805 Pasadena, CA 91109	Dora Meyer	(818) 354 - 6315
Jet Propulsion Laboratory Mail Code 249-113 Pasadena, CA 91109	Margo Kuhn	(818) 354 - 5722

National Aeronautics and Space Administration

Information Resources Acquisition Personnel

NASA Headquarters
Washington, DC 20546

Information Resources Management Policy Division- Code JTD

Director	Dietwald A. Gerstner	(202) 453 - 1775

Procurement Policy Division - Code HP

Director	William J. Maraist	(202) 453 - 2105

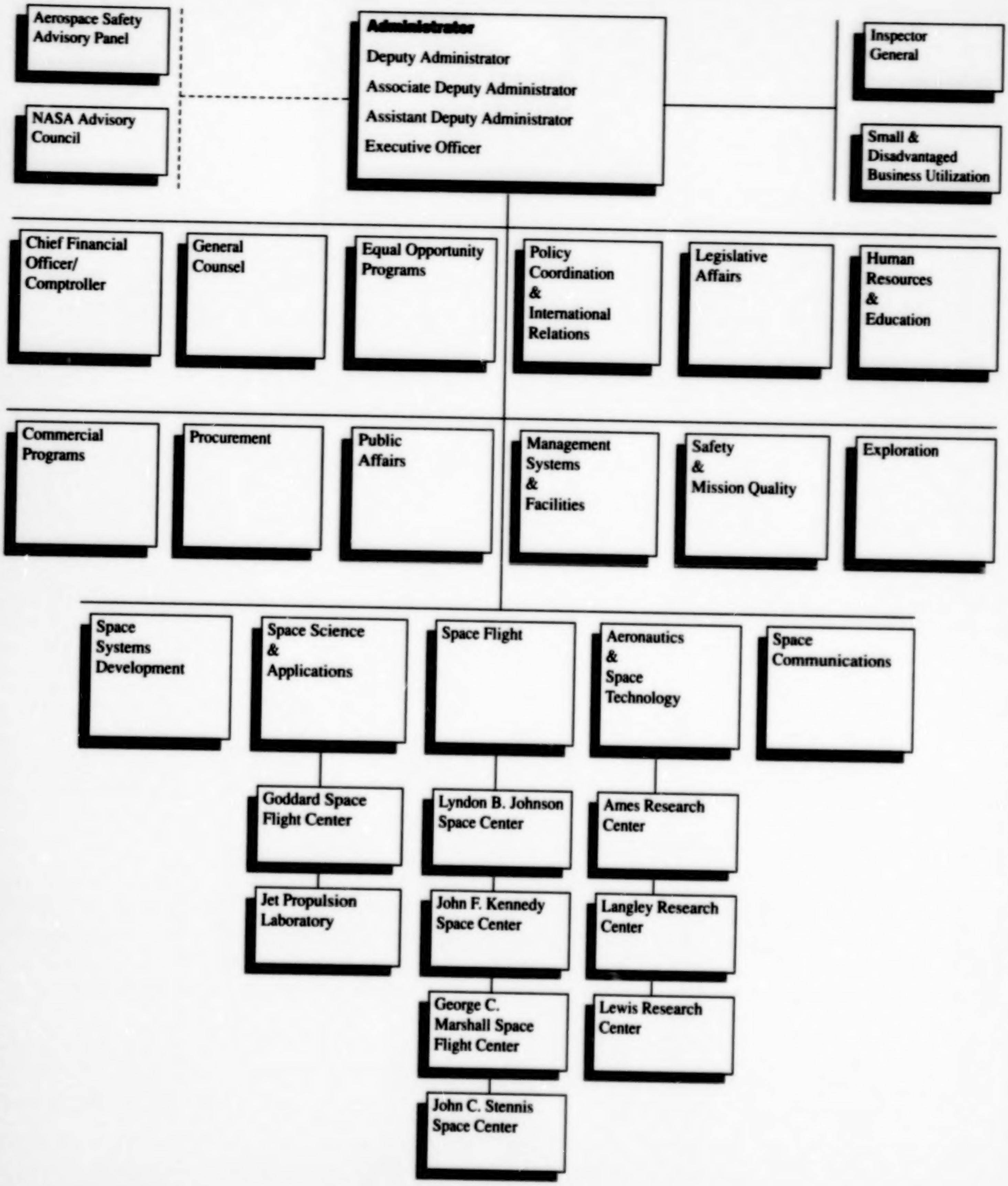
Headquarters Information Systems & Technologies Division - Code JZ

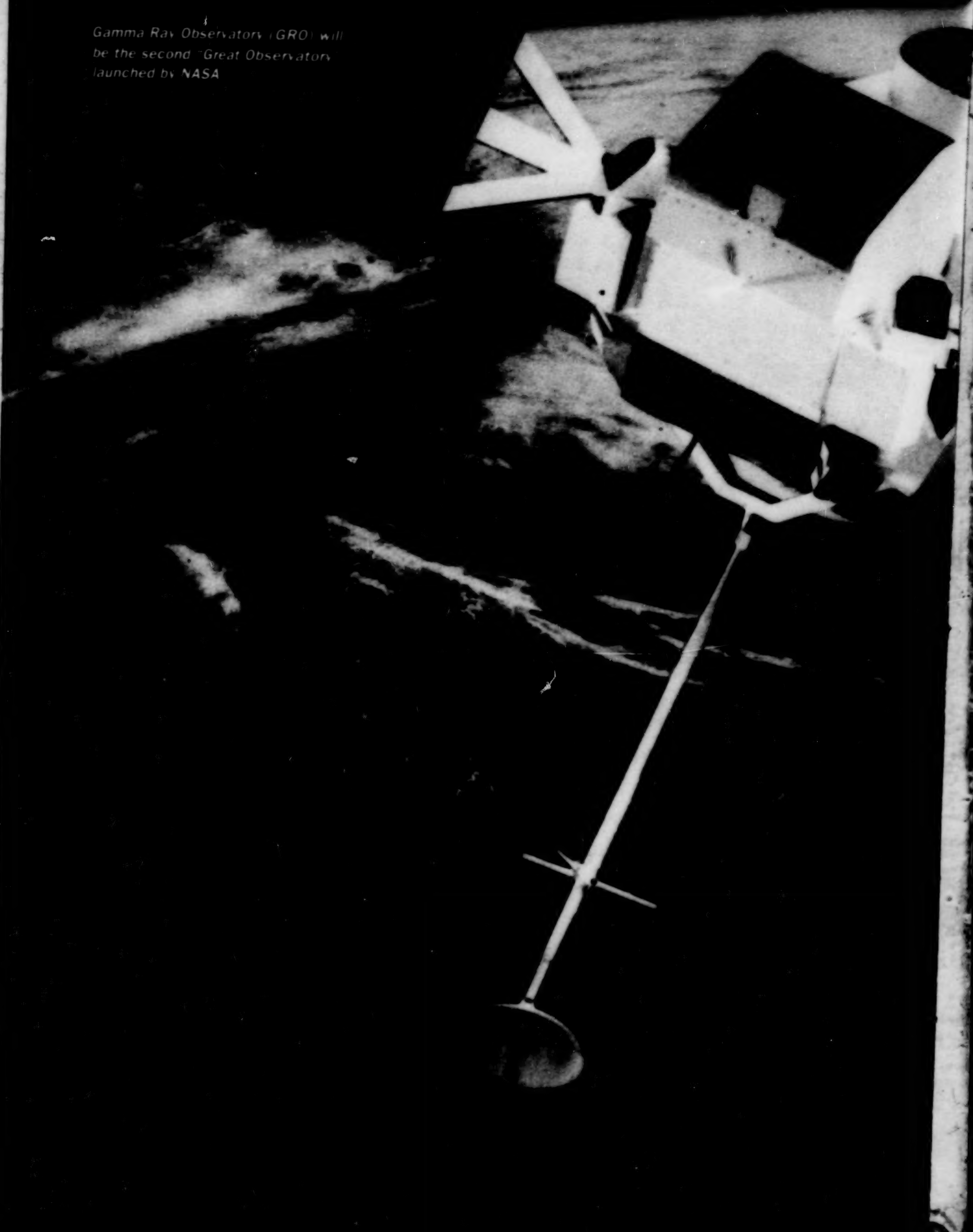
Director	Ronald W. Collison	(202) 453 - 2155

Field Installation Personnel

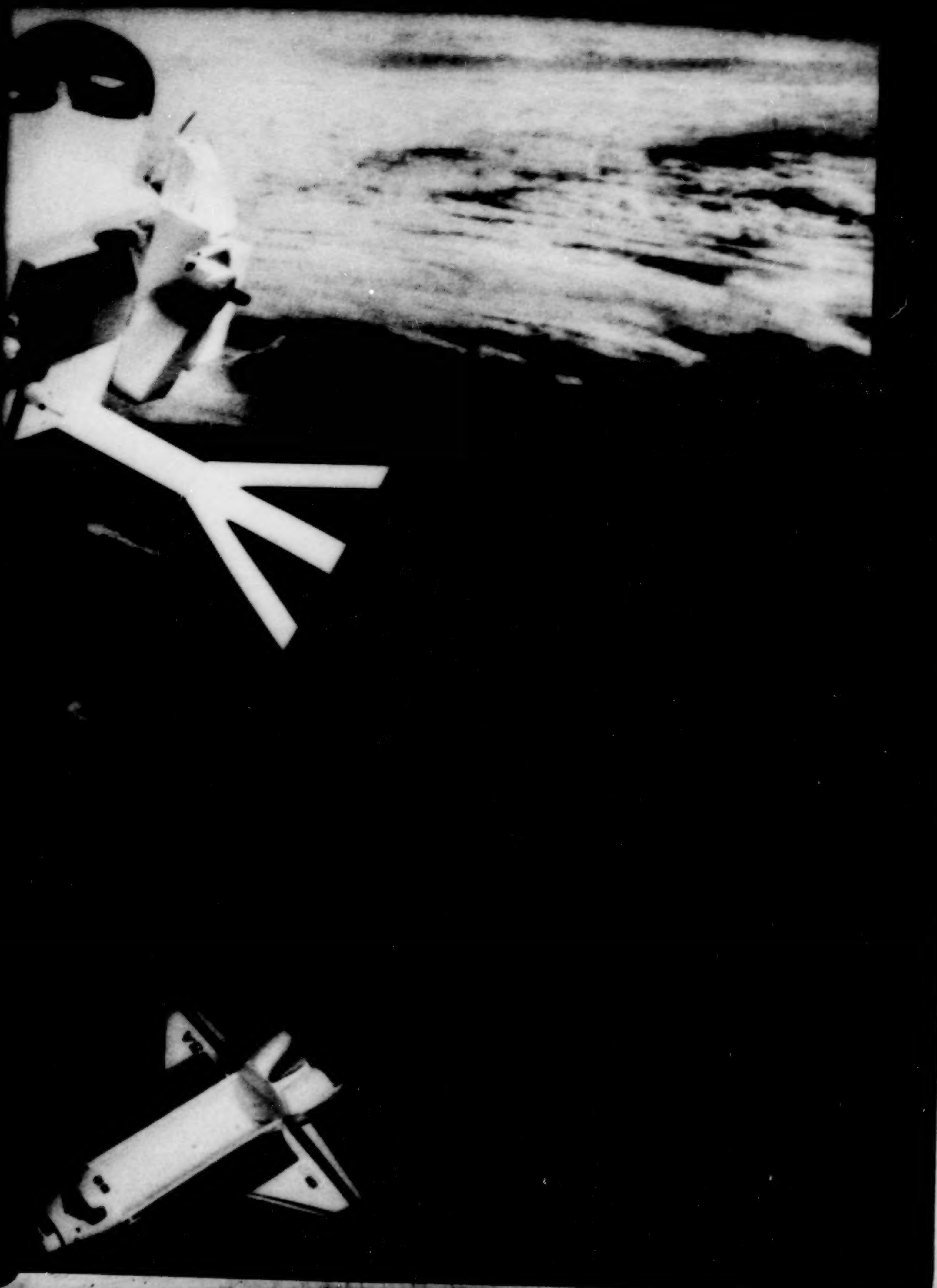
Ames Research Center Mail Stop 233 - 7 Moffett Field, CA 94035	Marcelline C. Smith	(415) 694 - 5188
Goddard Space Flight Center Mail Code 250.0 Greenbelt, MD 20771	Joe Barksdale	(301) 286 - 5652
Johnson Space Center Mail Code PA Houston, TX 77058	Don Simanton	(713) 483 - 9519
Kennedy Space Center Mail Code EX-INF Kennedy Space Center, FL 32899	Robert Yarbrough	(305) 867 - 7293
Langley Research Center Mail Stop 157 Hampton, VA 23665	Maurice K. Morin	(804) 865 - 3160
Lewis Research Center Mail Stop 142-2 Cleveland, OH 44135	Brent Miller	(216) 433 - 5165
Marshall Space Flight Center Mail Code AA01 Marshall Space Flight Center, AL 35812	John C. Lynn	(205) 544 - 0027
Jet Propulsion Laboratory Mail Code 180-805 Pasadena, CA 91109	Kathrine M. Wolf	(818) 354 - 4932
John C. Stennis Space Center Mail Code HA40 Stennis Space Center, MS 39529	Kirk V. Sharp	(601) 688 - 3586

National Aeronautics and Space Administration


Aerospace Safety Advisory Panel
NASA Advisory Council
Administrator
Deputy Administrator
Associate Deputy Administrator
Assistant Deputy Administrator
Executive Officer
Inspector General
Small & Disadvantaged Business Utilization
Chief Financial Officer/ Comptroller
General Counsel
Equal Opportunity Programs
Policy Coordination & International Relations
Legislative Affairs
Human Resources & Education
Commercial Programs
Procurement
Public Affairs
Management Systems & Facilities
Safety & Mission Quality
Exploration
Space Systems Development
Space Science & Applications
Space Flight
Aeronautics & Space Technology
Space Communications
Goddard Space Flight Center
Jet Propulsion Laboratory
Lyndon B. Johnson Space Center
John F. Kennedy Space Center
George C. Marshall Space Flight Center
John C. Stennis Space Center
Ames Research Center
Langley Research Center
Lewis Research Center



Gamma Ray Observatory (GRO) will be the second "Great Observatory" launched by NASA



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